THE GAS CHAMBER ON THE CHAMBAL

A Study of Job Health Hazards
And Environmental Pollution At NAGDA, Madhya Pradesh

PADMANABHAN V.T.

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PREFACE

The struggle for advancement of civil liberties in India has thus far remained restricted to highlighting of atrocities committed by the landlords, upper castes and the armed wings of the State.

But, the Fundamental Rights are being violated by industries which pollute the environment. This silent violence has irreversible consequences on the "life in toto", not only within the country but also on the entire planet.

There have been sporadic movements by workers and peasants, students and teachers against pollution. These movements, being unco-ordinated and local in nature, do not have the resources for compiling the required information.

It is here that the journalists and civil liberty activists can intervene, by giving propaganda cover for the people's struggles and seeking legal intervention where ever possible.

Keeping this in mind, thc Madhya Pradesh unit of the People's Union for Civil Liberties, has taken up investigation of violation of social legislations by industries which, in their pursuit for profit-making, show little regard for human life. The indirect onslought on the life and liberty of millions of citizens by the rich and powerful in the society is now emerging as a more dangerous weapon than guns and bombs. Mainly because destruction of environment and nature will ultimately mean death to the human race, although slowly.

The study of Gwalior Rayon Silk Mills (GRASIM) Nagda, Ujjain, Madhya Pradesh, is the first among several others that are being conducted by the PUCL-MP, in order to bring to the fore the ethereal destruction to life and liberty of ordinary citizens.

The Report has been prepared by Padmanabhan VT, a free-lance journalist, who has done his Research on Social Medicine and Community Health from the Jawaharlal Nehru University, New Delhi. Young civil liberty activists like Padmanabhan bring with them a burning desire to see a better tomorrow dawn. In order to reveal the truth, covered under the golden leaf, Padmanabhan has spent full six months and consulted many people directly

or indirectly connected with the question of life and death at Nagda.

His work is being produced here in printed form to make the truth known to the world and form public opinion, which, we believe, can play a significant role in fighting the monster of pollution. We also believe that it is pressure from below, generated by the people's movements that will ultimately silence this monster.

Being aware of the obvious limitations of such a publication in English, the MP PUCL would soon be coming out with a *Hindi* translation of this Report.

The problems faced by the people in and around other Rayon towns should be more or less similar. We would be only too willing to supply the literature available with us to groups and individuals interested in conducting similar studies.

The Gwalior Rayons have their joint ventures in Thailand and Philippines also. Ventures which bring us a lot of foreign exchange. If, however, the Company has started maiming and killing Philipinos and Thailanders, that is too bad. We would render all possible assistance to the Environmental Activists in these countries to help them study and publicise the problem.

We take this opportunity to thank all those who have provided help and assistance in bringing out this Report, which is an entirely new step forward in the struggles for preserving and promoting civil liberties.

It is not mere accident that we have timed the publication of this report on 5th June, 1983, the World Environment Day.

Rajendra K Sail,
Regional Secretary
PUCL MP

5 June, 1983.
Raipur, MP.

INTRODUCTION

The industrial society is built on the grave yard of thousands of innocent victims who died of occupational hazards. Martyrs who died to keep the machine moving. Starting with the eighteenth century, the epidemic peaked by mid-nineteenth century in that cradle of industrial revolution—England. The dead added a valuable lesson to our collective knowledge—that the occupational hazards cannot be cured, they can only be prevented. Today, many of the common health hazards can be prevented without affecting production.

Yet, in India we are repeating the history of 19th century England. A living example of this is Gwalior Rayon Silk Mills (GRASIM), Nagda, Ujjain, (M.P.) one of Asia's biggest rayon manufacturing units. With about 5,000 workers on direct employment, GRASIM produces artificial fibre out of wood pulp through a process called *viscose*. In India, there are three other units at Harihar (Karnataka), Mavoor and Travancore (Kerala); the first two being owned by the same company. All these three units, employing over 12,000 workers, account for 90 percent of the rayon produced in India.

The work environment has few gases, which are highly toxic. In the first part of this report, a few disabled workers narrate their tale of terror. We have tried to explain the reasons for their plight with the help of available literature.

This year, the Republic celebrates the diamond jubilee of the Workmen's Compensation Act, entitling compensation against job-related disability or death. Our victims would not get any. The first part of this report ends with a case study of an accident—the latest one in a chain of five major ones since 1963. Read the circumstances under which Gokulram was killed, and make your own judgement.

In the second part, we report what the peasants narrated in their *Malwi* mixed *Hindi*. The waste water containing highly poisonous chemicals are discharged into the river Chambal, their main life line till a few decades ago. The environment is also polluted with gases. All these have meant death and destruction to about a million people. The one time prosperous and picturesque villages with a healthy population now present a pathetic

picture of filth, stench, disease and slow death. According to a few scientists, the Chambal now contains toxic chemicals like zinc and mercury. Mercury can cause one of the most horrible man-made diseases, next only to nuclear radiation hazards.

Today, we have all the pre-requisites to prevent these gross human tragedies, control technologies available within the country and a legislation empowering the government to act. Industries do not instal the control measures because they do not want to invest on a non-profitable venture. We do not know as to why the governmental machineries entrusted with the task of pollution control do not act. We found them in a 'made-for-each-other-pose'. The Madhya Pradesh Water Pollution Control Board has, at times, gone out of its way in defending the Management. This is what we deal with in Part III—Politics of Pollution.

The story does not end at that. We also found a few silver linings. Awareness and awakening at the grass root level, a strong determination to fight till last. That is young Nagda. In Part IV we have only been able to draw a hazy outline of the emerging trend. Being too young, its visibility was poor.

5th June, 1983.

Padmanabhan VT

PART I

THE GAS CHAMBER

The Chambal has not only the gun-trotting dacoits.
There are others too.
Those who kill with gas
Gas which chokes and kills.
Inch by inch, like a sadist.
Unlike the gun, the gas is invisible.
And hence more powerful too. ...

"This is not mine, it belongs to some one else, "says, Mangelal (35). He is referring to the left side of his body, which, he feels, no more belongs to him. As if in a delirium Mangelal repeats the same story to all his visitors. "While eating my dinner, I felt a slight pain all over the left half of the body and after some time, a total senselessness."

Mangelal was daignosed as a case of *hemiplaegia* (left), which means the left half of his body is paralysed part of it resulting from injury to the motor centres of the brain. Mangelal knows for certain that he would remain a cripple for the rest of his life. And he knows the reasons for this too.

Not his 12 years old son, Chotelal. A student of VI standard, Chotelal lost his mother in 1980. And half his childhood too. Since then, he has been shouldering the responsibilities of the mother—cooking, cleaning the house and looking after the younger siblings. Soon he would be forced to play his father's role too. Chotelal would become an adult in his early teens. A cruel joke!

* * *

Thirteen year old Rajender could not answer that question, "why do children feel thrilled during Holi ?" His teacher did not

know that it was during a Holi, two years ago that Rajender's father became a cripple. At the age of 42, Dunger Singh looks twice that old. He speaks in mono-syllables. That too when compelled. Dunger Singh is also a case of *Hemipleagia* (left), but he is totally immobile. He has no control over his body, he lies on his cot all the day.

* * *

In September 1982, Mohanlal Soni (43) used to talk a lot about the national and international politics. An active member of the Communist Party of India (Marxist), in April 83, it was as if Soni lost interest in all that. He talked more about gases. Soni has just recovered from his second heart attack. After about two months of hospitalisation and a month of bed rest, Soni now limps back to his work place. Other wise, he does not move out of his house, even for shopping.

Soni became a heart patient at a very young age. He was 34 when he suffered his first attack. Since then, he has been on those pills. The second attack which took place in December 1982 was worse. It has totally shaken him up.

* * *

Kaluram Jain (48) does not work any more. He left his job in 1974, the year he suffered his first heart attack. He says, he is perfectly alright, but the moment he reaches near the faetory gate, he suffers from an endless number of symptoms like stomach ache, breathlessness etc.

Like many others, Kaluram Jain also knows as to who is responsible for his disability.

* * *

Mangelal, Dunger Singh, Mohanlal Soni and Kaluram Jain are workers of a factory which has been maiming and killing its workers for about three decades now. The erudite readers who might argue that these are exceptions can refer to the lists given at the end of this report (Table I & II). And now we move into the gas chamber.

The Gas Chamber

They all work in the Gwalior Rayon Silk Mills (GRASIM) Nagda in Ujjain district of Madhya Pradesh, established in 1954. The mill attracted peasant youths from the cotton growing Malwa and its neighbouring regions. In the process of making fibre without tilling or sowing, they also learned to adjust with a new rythm–rythm of mindless machines and managers, sirens and shifts. Much difficult was to live with the filth in the environment, the gases which irritate. Soon the workers, a fourth of them illeterate and another quarter studied upto primary, learned a few more names—CS_2, H_2S, H_2SO_4 etc., without of course knowing what they meant or realising what they could mean.

Within a year or so, the workers became victims of an endless number of diseases—ranging from headache and giddiness to indigestion to lack of appetite etc. Paesants who used to toil in their fields from dawn to dusk found themselves thoroughly exhausted after an eight hour shift which did not involve much of a physical exertion. Diseases assumed an epidemic form. Many attributed it to the evil spirits and rushed back to their villages to consult magicians and quacks. Few of them went to the doctors too, who gave them a lot of pills. Like the patients, the doctors also did not know all that well what they were treating for. Doctors, of course, did well.

The problems did not end with a few symptoms. The very nature of the workers was changing, of course for the worse. Some would become furious at the slightest provocation and quarrel with friends and other members of the family. Some would manifest withdrawal symptoms and behave like a heroin addict.

During the initial days, almost all the victims showed an increased interest in sex. But then, immediately after the intercourse, they would feel extremely tired. This was followed by a gradual loss of interest in sex, till the reproductive organ was rendered into a vestigial one. People who knew their history, recollected with nostalgia an event which had brought shame on the entire *Malwa** country some seven centuries ago. *Altamash***,

* *Malwa* is a region in the south-west of the present day Madhya Pradesh. Before Independence, it formed part of the then Gwalior State, notorious for its wreckless plunder of the interior and servile dependence on the British.

** A Moslem Ruler of Delhi.

a conquerer from Delhi had ravaged *Malwa*, and looted among other things the '*Lingam*'*** from *Mahakaleswar* temple at *Ujjain*[1]. That was his way of insulting the vanquished. (By the way, today's imperialists do not look for such trivialities.) But then the loss of *lingam*, did not in any way hinder the perpetuation of species. Today it has. The loss of their manhood was the proverbial last straw for many, who ran back to villages. Before they left, they gave a new name to the factory—*the slaughter house of man*. Had they known a bit of modern European history, they would have given a more appropriate name—*the gas chamber*.

The wheels of industry kept on moving, with ever increasing speed. Production and profits climbed new heights. Cartographers translated them into the language of lines on graph sheets, to be proudly displayed in air-conditioned rooms. Managers smiled. Trade Unions bargained for bonus. And, the men who worked in the shop floor containing deadly gases vegetated and marched slowly towards their graves.

Artificial fibre is manufactured through a process called *Viscose*. Main raw materials are wood pulp, caustic soda, sulphuric acid and carbon-di-sulphide (CS_2). Wood pulp is brought from sister units at Harihar (Karnataka) and Mavoor (Kerala). Other raw materials are manufactured at Nagda itself.

Pulp is first steeped in caustic soda to obtain a mat of alkali cellulose. The cellulose is then mixed with carbon-di-sulphide (CS_2) in a rotating barrel called churn. The product at this stage (known as *xanthate*) is again dissolved in dilute caustic soda solution. The *xanthate* has now become *viscose*. *Viscose* which looks like thick honey is then pressed through spinnerrets, the size of a closed fist, with 8 to 12 thousand pores. This process is called spinning, which also involves an acid bath in sulphuric acid and few other salts. This happens in the Stuple Fibre Division.

The allied units (all grouped as Chemical Division) manufacture the chemical raw materials required. Carbon-di-sulphide is produced by burning charcoal and sulphur under high pressure in

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*** *Lingam* or *Shivalingam* literally means penis of Shiva, the destroyer among the Trinity. It symbolises strength and vigor while its feminine counterpart, *Yogi* (Vagina) stands for fertility. With the defeat of matriarchy, the *Yoni* also lost its predominance.

electrically heated furnaces. Caustic soda is obtained by electrolysing common salt (sodium chloride). The process involves mercury which acts as a positive pole (cathode). Sulphuric acid is manufactured by burning sulphur.

The Gases and the Games They Play

The work environment has many gases, few of them highly toxic. The deadliest among these are carbon-di-sulphide (CS_2), hydrogen sulphide (H_2S), sulphur dioxide (SO_2), chlorine and mercuric vapour. This report focusses on the first three gases. At this stage, a brief description of the gases and the games they play would not be out of place.

Carbon-di-sulphide : The Castrating Gas

"He who works in carbon-di-sulphide is no longer a man", Delpech, a French scientist, 1864.[2]

Carbon-di-sulphide is an extremely explosive gas which can be liquified. It is sweet smelling and colourless. It is heavier than air and water. A good solvent of fat, its first large scale use was made in the rubber industry.

Being heavy, the sweet smelling monster cannot seek higher levels. From the breathing environment, it moves into the lungs, from where it boards the oxy-hemoglobin train, which carries oxygen to the rest of the body. The gas has a marked preference to the nerve tissues where it stays as long as 14 hours.

Within a few months of exposure, the host gets to know the presence of the invisible guest through a series of symptoms like headache, giddiness, excessive perspiration of hands and feet etc. At an advanced stage, the symptoms are memory defect, sexual excitability, gradual loss of interest in sex, loss of sensations etc. In the final stage comes any of the perennial disabilities ranging from paralysis to psychosis.

CS_2 is a slow and accummulative poison. Which means that its action is slow and the damage builds up over a period of time. In the initial and intermediate stages, the patients appear to be perfectly healthy. Where the work does not involve much of a physical exertion or mental abstraction, the worker is more or less regular in his attendance. Like the gas which is invisible, its

action also remains so, at least during the first few years of exposure.

The first comprehensive scientific exposure of the hazards of CS_2 came from two American scientists, Gordy and Trumper in 1905[3]. They found the following symptoms among the CS_2 victims :—

(a)	Encephalopathic features (varying from lethargy, anxiety states, irritability to vertigo)	90%
(b)	Diminution or loss of libido	75%
(c)	Neuropathy (varying degrees)	70%
(d)	Eye symptoms (subjective)	67%
(e)	Gastro-intestinal	66%
(f)	Asthenia, headache, muscular stiffness, dyspnoea	50%
(g)	Parkinsonism and localised symptoms of the brain	55%
(h)	Vasomotor symptoms	30%
(i)	Blurring of optic disc	30%

It was in the year 1851 that the first scientific recognition of CS_2 as a deadly poison came. Ever since, evidences of newer and newer illnesses have been piling up. A recent finding from Finland is the most shocking of them all. In 1975, the Finnish researchers found that the exposed workers who had no complaints or clinical manifestation also "displayed major impairment in behavioural performance tests involving speed, vigilence, dexterity and intelligence. This shows the evidence of a latent psychological syndrome of CS_2 poisoning in exposed workers, who do not display impaired health or personality changes, but considerable loss of mental capacity. ...Exposure may make the workers more accident prone on and off the job."[4]

Laudenhiemer, a German scientist was more than prophetic. In 1899, he said : "In CS_2 poisoning everything occurs."[5]

Hydrogen Sulphide (H_2S)

This is a foul smelling and irritant gas, more toxic than CS_2. When inhaled in small amounts it depresses; in larger amounts stimulates; and in still larger amounts paralyses the nervous system. Acute H_2S poisoning results in death due to the failure of respiration. It is as fast as cynide. When the intake is in small quantities, the effect of H_2S is more or less similar to that of CS_2.

Sulphur Dioxide (SO_2) : Abide with Me My Lord

SO_2 is also an irritant, practically irrespirable to those unaccustomed to it. High concentration of sulphur dioxide in the streets of Tokyo and similar large cities in the West is one of the biggest health hazards of the day.

SO_2 acts, by and large, on the respiratory system. Once inhaled, it creates irritation to the airway passage of the lungs called bronchioli, resulting in inflammation and constriction of the passage over a period of time. This is called chronic bronchitis and the symptoms are dry cough and breathing trouble. In 0 to 70 per cent of cases, chronic bronchitis has yet another companion called chronic gastritis—a disease of the digestive system with symptoms like lack of appetite, digestive troubles etc.

In chronic bronchitis, the quantity of oxygen entering the lungs becomes lesser and lesser. As a result, the lungs find it increasingly difficult to purify all the blood received from the heart. To keep the show going, the heart works harder and harder. Till it gets tired. And that is when the bronchitis graduates to heart disease. If you are poor, stay home and offer your prayers. The best one for occassions like this is a Christian hymn: "Abide with me My Lord, Fast Falls the Even tide."

If you are rich, go to a hospital, preferably to the *Janaseva* hospital, Nagda, and enjoy the super-specialities in coronary care and pay through your nose. Take those pills which stimulate the heart to work harder and harder and live for few more years on borrowed energy. Till, of course, your heart says : 'Man, let's call it a day'.

The Buried Report

The victims of the gases, martyrs of an industry whose annual net profit has crossed Rs 100 million, are being buried

unceremoniously. Much before this was also buried a government of India Report which pre-warned of the impending catastrophe in the first decade of the Republic.

This Report (Survey of Carbon-di-sulphide, Hydrogen-sulphide and Sulphur-dioxide Hazards in the Viscose Rayon Industry in India) was prepared by a Committee of three scientists- Dr Harihara Iyer, TD Raisinghani and Dr MN Gupta. The team, on behalf of the government studied the situation in three Rayon factories in India.

The Committee found that the situation in many departments was alarming (See Tables III, IV and V). We quote from the report: "the CS_2 retort attendants in all the factories were thus found to be exposed to toxic concentrations of sulphur-dioxide. The same observation holds good in the case of most of the spinners in the three-factories and to the churn room helpers in two of the factories. The 'spinning-after treatment-tank attendants' in one of the factories were also likewise exposed to concentration of the gases exceeding the threshold limits. Suitable remedial measures to safeguard the health of the workers are urgently called for."[6]

The Committee observed more than 75 symptoms, most of them attributable to the damage caused to the nervous system. Few among them are memory defects, sleeplessness, loss of interest in sex, chronic fatigue etc. About half the workers were found to be victims of the hazards. Two case studies from the Report are reproduced below :—

"1. Case No. 21 RKN. age 32. service 6 years. Works as a group leader in Spinning After Treatment Department. Married. One child. Exposure to CS_2 and H_2S 5.8 and 4.5 parts per million (ppm) respectively.

History. He complains of loss of appetite, indigestion, nausea, loss of taste, sore tongue, burning in chest, pain in joints, memory defects, insomnia, bad dreams, depression. forgetfulness, head ache, vertigo, fainting, giddiness, chronic fatigue, perspiration of hands, pins and needles (sensation of), numb and cold fingers, pain in legs, muscle cramps, early fatigue, pain and tearing in the eyes, spasm of lids, bad and disturbed sleep, does not like to read or write (read upto 4th form). He feels extremely tired after coitus and has lost desire for it....."

"2. Case No 138. RBU. age 30. service 3½ years. Spinning operator. Married. With three children. Matriculate. Exposure to CS_2 30.3 and H_2S 10.3 ppm respectively.

History. Complains of loss of weight (4 lbs), loss of appetite, indigestion, nausea, constipation, loss of taste, pain in chest, breathlessness and cough, pain in joints, memory defects, insomnia (sleeplessness) bad dreams, loss of libido (interest in sex), broken and meagre sleep, day drowsiness, withdrawal, forgetfulness, head ache, vertigo, fainting, giddiness, apathy, chronic fatigue, crawling ants, numb and cold fingers, pain in legs, muscle cramps, early fatigue, sore eyes,.. field of vision diminished".[7]

The Committee recommended immediate action to bring down the concentration of the gases, a reduced workday not longer than 5 hours a day, routine medical examination of the workers and adequate medical cover. (Full text of the recommendations is being reproduced as Annexure I to this report).

Rather than acting upon the Report, it was surreptitiously moved underground. Today, neither the Lok Sabha Library, nor the Libraries of the concerned Ministries have a copy of the Report with them. In Nagda, the AITUC leaders say that the report fetches as high a price as Rs. 5000!

How Safe is 'the Safe Limit'?

With the existing level of technology, it is almost impossible to bring the work room pollution to zero level. As such, certain "safe limits" are laid down, based on an epidemiological survey of the work force. Major factors taken into consideration in such a survey are standard of living, nutritional status, climate etc. This "safe limit" is known as 'Threshold Level Value' (TLV). The TLV for Rayon industry gases is 20 ppm in the US and the UK. The 1958 Committee recommended the same TLV for India also, without taking into consideration the differences in socio-economic conditions and climate. The Report itself shows that the 20 ppm concentration is much above "the safe limit". (See the case study of RKN, reproduced earlier. He was exposed to a concentration of 10.3 ppm only).

There is yet another lacuna in the Report. The Committee had observed that in places where more than one gas is present,

the combined concentration should not be more than 20 ppm[8]. This has not been clearly laid down in the recommendation.

Today, the Report is partially out-dated for three reysons. *Firstly*, since 1958, Rayon production in India has more than tentupled; Nagda alone registering a 15 times growth. Much of this growth has been achieved by innovations, rather than physical expansion. According to the workers, with each such innovation, the work room pollution has only worsened.

Secondly, the Rayon industry in India was only 8 years old during the survey. Half the workers were exposed to gases for less than four years. Being accummulative poisons, the impact of of the gases can only be felt in full after a long period of exposure. The Committee could not come across with any terminal cases; it could only observe the beginning of the end.

Thirdly, after the sixties, a few more items have been added to the long list of Viscose Rayon hazrads. We have already seen the findings of the Finnish scientists. In 1970, yet another scientist reported the incidence of coronary heart disease among viscose rayon workers[9].

Medical Care : Workers' Health in Workers' Hands

The gas hazards cannot be cured. However, an early diagnosis can prevant further damages by corrective actions. In the case of heart diseases, specialist care can delay the certain death. As such, the role of the medical man is extremely limited.

The Viscose Rayon Report says : "the average industrial physician in the country rarely comes in contact with cases resulting from chronic carbon disulphide poisoning. The details of investigation carried out in this survey, alongwith the findings of other investigators and the statistical tables will assist the medical man in proper understanding of the problem". And it recommends "routine medical examination of all workers exposed to these chemicals (...) be carried out and results recorded on properly designed forms, at least once in every six months".[10] Over and above this, there is a clear cut regulation laid down by the Indian Standard Institution (ISI) which is legally binding on the industry. "Workers exposed to CS_2 should be examined frequently by a physician acquainted with the hazards involved. The periodic

examination should include standardised measurement of blood pressure, sample observation of reflexes and querries as to the symptoms indicating poisoning".[11]

Periodical medical examination–No. Competent physician–No. There is a dispensary run by the Employees State Insurance Corporation (ESIC) with 10 doctors (all of them simple graduates), few paramedics and a lot of pills. All the doctors heard about the hazards of the gases first from the patients. None of them has understood the real meaning of it.

The ESI has nothing to offer, except of course the all-too inadequate sick dole. The doctors are there to sign papers related to medical leave etc. Workers suffering from heart diseases or any other gas related hazards are directed to report to Janseva Hospital. (This direction is given verbally, else the ESIC would be bound to reimburse the expenses).

Attempts have been made recently by Junior doctors to go to the roots, only to be frustrated by the men on top. Says a junior doctor ; "More than half the patients blame the environment for their sickness. We do not know what is the situation inside the factory. Once we apprised Dr Dave, our Director, who told us not to bother about the gases".

Being too poor in documentation, the ESI would not be able to help in conducting a survey of the sickness. "That way, none of the Committees which came to Nagda (especially those sponsored by the Pollution Conrtol Board) approached the dispensary for medical statistics", claims another doctor.

The ESI could have done a lot to prevent the mass murder taking place in Rayon industries. It did not do any. Are'nt few hands in that organisation, ostensibly created to protect the workers health, stained with blood?

Why is the ESIC, maintained out of the contributions from workers and the governments, silent on this issue? There is no answer to this question. Like many others.

Jan-seva alias "Jaan-leva Hospital".

The factory has a captive hospital owned by the Janseva "Trust". Jan-seva hospital is, for many people in Nagda, a 'Jaan-

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leva' (life-snatching) Hospital. The Hospital has an intensive care unit (ICU) and facilities for emergency heart operations. There is always an over-crowding of heart patients. Naturally !

"Janseva hospital was built primarily to prevent the diseased workers from approaching other hospitals, or else the medical information might get leaked", says a junior doctor of the ESI. Uncomfortable information is like a dynamite. Why else should the hospital authorities refuse to provide information like details of patients admitted, their diagnosis etc?

There are other obvious advantages too. It is a good money spinner. The average medical bill of a heart patient admitted in the hospital for a month works out to Rs. 4000.00. This does not include the money he has to spend on buying medicines from the market.

The practice of making the workers pay for the diseases they contracted during the work process might appear very cruel to you. But that is the reality in Nagda.

The Avoidable Accident

The employees have been dying of accidents too; accidents which could have been avoided. One such accident took place on 27th January 1983, in the carbon-disulphide plant.

Gokulram died while cleaning furnace No. 12A. The cleaning, which has to be done periodically, involves digging of molten materials from the base of the furnace. Shankarlal, a helper, who was also on the same job that day, narrates the incident : "four of us were working on two shifts of thirty minutes each. Digging is a hard job; as such you cannot remain on the job for more than 30 minutes at a stretch. At around 4 PM that day, Gokulram and Madanlal entered the furnace. After 15 minutes a chunk of molten material blocked the only entry to the furnace, preventing the air circulation. A few minutes later, Madanlal came out of the furnace by climbing on top of it. (The furnace is approximately 20 ft high). He shouted "Gokulram has been hit by gas" ("Gokulram ko gas lag gaya"). Other workers from inside the plant came running. We all attempted to remove the block, and failed. Then a crane was brought near the furnace, I went inside the furnace, tied Gokulram on a rope and brought

him out. He was rushed to Janseva Hospital where he was declared dead. This was around 5 P.M. At around 12.30 AM, Gokulram's body was rushed to his village in *Pilani* (Rajasthan) without conducting a post-mortem examination".

Why was his body not handed over to the police for post mortem examination? "There were a few Marwari workers, who were adamant that the dead body should not be mutiliated. There was a possibility of confrontation", says Deputy Manager NH Taneja. If you are convinced by this reply, stop reading further.

What do others say about the incidence? "A report was lodged at the police station, which is only a few yards away from the Hospital. They refused to come", says Pushpangadan of the CITU. Tawarchand Gehlot, MLA (BJP) has some thing more to add : "the Management is guilty of not submitting the body to the police. This accident is an index of callousess and lack of essential facilities inside the factory".

What are these essential facilities?

When in doubt, dig deeper.

The Indian Standard Institution lays down certain guidelines for cleaning of CS_2 furnace. Read standard No IS 5685 of 1970 :

"Para. 11.8. One man on the outside of the tank should keep the men in the tank under constant observation and at least two men should be available to aid in rescue, if any one of the men in the tank are overcome".

These three men, one on constant observation and the other two on stand-by duty, comprises the rescue team. There was no rescue team on 27th January 83.

Read further.

"Para 11.9. A supplied air respirator or self contained breathing apparatus together with rescue harness and life-line should be always located outside the tank entrance for the rescue purposes regardless of the respiratory equipment or the air supply which is provided for the employees inside the tank."

The employees inside the tank were not provided with breathing apparatus. There was no breathing apparatus, rescue harness and life line outside the tank either.

Anyone acquainted with CS_2 manufacture would tell you that gases like H_2S, SO_2 and CS_2 remain trapped underneath the molten material being dug out. *According to Shankarlal, it is this gas which choked and killed Gokulram.*

":*Indore Charcha*," a tabloid published from Nagda, throws further light on the situation inside the factory. According to this paper, Shankarlal had to go inside the tank without wearing a gas mask. "The shift engineer had provided him with a mask. He refused to wear that since that was not of the proper size".[12] Says Shankarlal : "next day, I appeared as a witness before the routine inquiry. Before that, Taneja saheb asked me not to mention anything about the gases or the mask".

A week later, during a cultural meet organised by the staff club, Mr. Taneja would say, "in our daily life, we all wear a mask." Gokulram died. He had never worn a mask in his life.

Investigation—For Masking or Unmasking?

The accident is being investigated by a Chemical Engineer from the Government College of Engineering and Technology, Raipur. The government seems to think that this Professor is the only qualified person to investigate such accidents. For instance, on 23rd July 1980, when the CS_2 line in Simplex Department of the Staple Fibre Division burst, killing two persons (Mr Abdul Aziz, a worker and Mr Niwar an engineer) it was this Professor who was called to investigate. According to BMS sources, the professor found the Management not at all guilty. His Report was not distributed among the trade unions.

"That way, even an unbiased report does not alter the situation in any way", adds Krishnaswamy of the AITUC. "For instance Tarachand Srivastva a retired High Court Judge had observed that the Management was guilty of negligence in the first major accident in the CS_2 plant which killed five workers on 8th August, 63. The Report of the learned Judge was thrown into the dust bin", Like they threw the dead body of the killed workers.

According to the Grasim Mazdoor Union, the 8th August accident was attributable to :

(a) Using the furnance beyond the period of warranty;

(b) working beyond the capacity—using 3600 Amperes as against the authorised capacity of 2500 Amperes; and

(c) safety regulations not heeded while constructing the plant.[13]

Since then, a lot many accidents have taken place. Accidents which could have been avoided .....

What price human Life?

Carbon-di-sulphide, Sulphur-dioxide and hydrogen-sulphide are internationally recognised killers. Carbon-di-sulphide poisoning is a notifiable disease under the Factories Act 1948. *But the cases of poisoning are not being notified in GRASIM.*

After being permanently disabled or killed, what do the workers or their families get as compensation? Nothing. As far as the Management is concerned, "the few cases of disability have nothing to do with the work room environment". However, the workers employed in certain departments receive a compensatory allowance ranging from 15 to 25 percent of their basic salary. (Minimum basic in GRASIM is Rs. 122.00). *The workers call this as "gas allowance."*

The compensation against death/disability for work—related hazards is to be paid by the ESI, wherever it operates. Why does a welfare wing of the government deny the existence of job-health hazards in the Rayon industry and thereby force hundreds of workers and families to take to begging bowls? Your guess is as good as ours.

The Constitution and the Factories Act :

Article 39 (e) of the Constitution :

"That the health and strength of the workers, men, women and the tender age of the children are not abused and the citizens are not forced by economic necessity to enter avocations unsuited to their age and strength".

Chapter III of the Factories Act 1948 ensures a safe and healthy work environment for all the workers. Where the industries violate the norms, the Government is empowered to act. Questions have been raised in the Assembly and Parliament, replies were promptly given. Beyond this, there is no evidence of anyone acting. If they did, things should have been different.

The workers in "Those factories who presented themselves for medical examination at some personal inconvenience to themselves"[14] have been waiting for all these years for the Government to act. All of them experienced their condition worsening day by day, year by year. Many of them crawled to their graves. The less fortunate ones still vegetate, with almost all their vital functions impaired. New hands replace the old ones, inhale and accumulate the poison in their nerve tissues, all the while keeping the machine moving.

Till the early twenties of this century, the Vulcanising Rooms of the Rubber Factories in England had their windows barred to keep CS_2 victims from leaping out during a delerious attack. As if to hide the ugly ulcer of the industry from the common man. In India, we have gone a step ahead. We have allowed the Survey Report to move underground. **The civil society should not know that the hi-fashion fabrics it wears is stained with blood.**

PART II

CHAMBAL—THE KILLER

The Chambal has also started killing.
Anything and everything Which comes into contact with it.
Slowly and gradually.
But before that, she has killed herself
Or has she been killed ?
That is the story of a new civilisation,
River based of course,
But not river centered ...

THE KILLER DRINK

The Chambal — Two Classes, Two Legends

For the *Dalits** in Malwa, the Chambal is the symbol of revolt against the upper caste tyranny. The legend has it that the river originated in the house of Saint Ravidas in the present day Mhow district. The saint had a young guest from upper India, on whom fell the lecherous eyes of the Rajput ruler. The king marched with his troops to the Saint's house. The young woman transformed herself into a river. There is the Chambal for you.[15]

Downstream in the ravinous districts of Bhind-Morena, the Rajputs would tell you a different story. Here, the Chambal is a

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* *Dalits* refers to the 'untouchables' — the most oppressed of the Feudal India. For Mahatma Gandhi, they were '*Harijans*' (literally *sons of God*), for the Government, they are Scheduled Castes. Dalits (literally, the *Oppressed*) is the term coined by the most militant among them. Their organisation, *Dalit Panthers*, which had fought militant battles in the sixties and seventies, is now a divided house.

cursed river, it does not support anything but the fugitives. The caste Hindus believe that the river had its origin in the slaughter house of Raja Rantdev, who used to kill thousand cows a day. The original name of the river was 'Charmanvati', which means the one that originated from the hide. Original sin for the Hindus.[16]

Legends apart, the Chambal was the main life-line for the entire Malwa tract, people depended on it for their very existence. Not any more. Today, the river is a killer, carrying with it tons of muck and dirt, many of them highly toxic to human, animal and plant life. For an entire stretch of 30 Kms., the Chambal has become an acquatic desert, with no fishes or other animals.

People living on either banks of the river, from Nagda to Rajpura, in a stretch of 20 Kms. say that they are forced to drink the poisoned, stinking water. The rich in the villages have dug their private wells, but the chemicals have seeped into them too. "*If smells of kerosene*", "*If you boil milk with this water, it gets spoilt*", "*we can't even cook dal in it*", these are the average responses. According to Tawarchand Gehlot, MLA, the drinking water problem is very acute in villages Juna Nagda, Banwara, Moukdi, Tal, Lodh, Kilodhia, Gidgarh, Ninawatkheda, Handor, Atlouda and Rajpura.

In Kilodia village, a 35 year old farmer who looks 20 years older, says that he cannot eat more than two chapatis. He cannot work as hard as an adult of his age either, and "gets thoroughly exhausted after an hour of ploughing". His son, a High School student says that many people in the nearby villages too are victims of similar diseases.

The list of diseases that way is endless; few of them feel sleeplessness, others have digestive troubles, intermittent head-ache etc. Skin diseases like rash, itching etc., are very common especially among the children.

The villagers of Juna Nagda do not use the river even for their ritual bath after birth and death. But their cattle stray away and drink the water. The peasants say that premature cattle death and abortion is very common in the area. In the first week of February 1983, Umrao Singh and Kalu Singh lost their buffal-loes aged 5 and 7 years respectively. Kalu Singh says that rearing milch animals is a loosing proposition. The yield is less than a

quarter of the normal. "But for the importance we attach to cow dung, many of us might have disposed off our cattle". "But then who would buy our cattle ? Even the cattle price has gone down".

Further down in village Kilodia, the farmers become terror-stricken at the sight of an urban outsider. He could be a bank employee, coming to serve the notice for the loan. The pump set they bought with the loan is not being used, since the water has become unfit for irrigation. The average response in this village is "we have been reduced to beggars".

The villagers in Durgapura, 2 Kms. east of Nagda have quite a different set of problems. The women show the brass vessels which are blackened. Not that these are the only victims, they are the most visible ones. Major health problems of people in the village are dry cough, difficulty in breathing, indigestion, lack of appetite etc. "During nights, especially in the winter months, we cannot keep our windows opend. There is a high concentration of gases, which irritate and, at times, makes breathing difficult," says a 25 year old youth.

BS Rajput, a 50 *bigha* farmer of village Padlia says that his crops are frequently damaged by the gas. "We keep our fingers crossed during the flowering season, which is the most difficult period- The gases burn the flowers and tender leaves". "Every season, 30 to 40 farmers of this village, who are otherwise rich owning fertile land with canal irrigation, are forced to take to begging bowls", adds Rajput. All the villages in an area of 5 Kms. radius from Nagda have similar problem. Fruit yielding plants like Guava and Mango have suffered a permanent loss of their productive capacity.

The *karma** philosophy of the masses teach them to fold their hands and look towards the sky in deprivation, disease and death.

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* *Karma* philosophy tells the oppressed Hindu masses to do their duty to the utmost of their ability and not to bother about the fruits. Which means, the land-lord would take care of the produce of their labour. This is diametrically opposed to the theory of pre-determination of Christianity. A religion with no form of structure, Hinduism has shown its flexibility to adapt to capitalism too. Hence no need for a Calvin or Luther.

Do the villagers who narrated their tale of agony and anger, pain and frustration look up to the sky for the cause of all these ? No. They would point to a huge chimney which emits thick fumes of smoke or take you to a *nallah*, carrying huge quantities of thick, foulsmelling water which joins the Chambal near Nagda Railway station.

The source

The story takes us back to early 1954, when Nagda, in tehsil Kachrod of Ujjain district, then a small village with less than 500 people was poised to become one of India's premier Industrial Centres. That year, "Gwalior Rayons came forward to solve the ever-increasing problem of clothing the masses" with the artificial fibre manufactured from wood pulp. Started with a production capacity of 15 tons, today its maximum capacity is well over 200 tons a day.

Hard working peasants who used to cultivate cotton in the black Malwa cotton soil lost their land to the factory for a pittance. According to Indian National Congress sources, the company paid them Rs. 40.00 a *bigha** as against Rs. 125 promised in the beginning.[17]

The disinherited peasants were destined to die in depriviation, since the majority of them were not even considered for the factory job. Says a sixty-year-old *Dalit* of village Nagda : "Mandelia saheb[18] entered into an agreement with the *Thakur* landlords that no harijan would be given job in the factory". Lest it might disturb the age-old master-slave relations in the villages nearby. The super technology of rayon production would co-exist with the age old, of stinking and dehumanising caste system for many more years to come.

The main raw materials used in the production line are wood pulp, caustic soda, sulphuric acid and carbon-di-sulphide, and of course water. Wood pulp is brought from sister concerns in Kerala and Karnataka. All the other chemical raw materials are manufactured at Nagda itself. The Caustic Soda Plant, established in 1972, is now poised for a further capacity expansion.

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* *A bigha* equals two-fiflh of an acre.

Water required for the production and the consumption of staff and workers is drawn from the Chambal — an estimated 2½ crore gallons a day, according to AITUC leaders. For this purpose, the Company has built two reservoirs, 2 Kms. upstream Nagda. Says Babulal Bharatiya, who has his farm lands adjacent to the reservoir : "During the summer, when the water is very scarce, the factory does not allow the farmers to irrigate their land. Security guards, who keep a round the clock vigil, even assault the villagers."

The industrial wastes are discharged back into the river through an open *nallah* which travels in a big zig-zag for about 2 Kms., till it meets the river Chambal near Nagda Railway station. *The chemicals within this waste interact among themselves producing irritating gases.*

According to Umrao Singh, a peasant of Nagda village, the Factory Management did not even bother to warn the villagers that they are discharging the effluents containing toxic chemicals. People were dying, of course, till they learned to avoid the river. Fish and cattle also died, they still do, being dead slow in learning. *Chambal, the life-giver, had undergone an overnight transformation into a killer.*

For nearly three decades, the peasants of *Malwa* have been learning their lessons on environmental pollution. A learning for which they had to pay heavily, with their very right to lead a healthy existence. Remember, this was happening much before the urban intelligentsia got frightened over the large scale environmental destruction. Much before the *Hindustan Times* warned its readers : "With little or no check to safeguard our water system from industrial or other forms of pollutions, the life saving drink may no longer be all that safe...25,000 people die every day in the world either from shortage of water or by the use of polluted water ... four out of five children in developing countries die of water borne diseases"[19].

A sorry state of affairs in Madhya Pradesh is that the government would not even give credit to the common man for the lessons he has learned on pollution, and for which he has sacrificed a lot. "Now-adays, if a buffalow drinks water downstream from the factory and dies, the villagers will protest

that it died of drinking polluted water. They never even knew what the word pollution meant, until we told them",[20] said an M.P. official to Dom Maraes who was commissioned by the Environmental Planning Committee of Madhya Pradesh to write their achievements in the field of pollution control.

For about a decade and a half now, a few scientists have been attempting in vain to teach the M.P. government officials a few lessons on water pollution. Before we talk about them, a brief exposure to the process of life and death of a river would be helpful.

When the River Dies

Before a river starts killing men and animals, it dies itself. Sounds mysterious. Let us see what it means.

A river contains two types of micro organisms — *aerobes* which, like us the human beings, cannot do without oxygen; and *anaerobes* for whom oxygen is in-essential. The former live at the top layers, the latter at the bottom. When you throw a lot of muck in the river, the ecologist gives you a dirty look, but the aerobes and anaerobes don't. They eat them up, and since they have nothing else to do they make love and multiply in the true biblical spirit. Now the organic waste has become inorganic minerals which despoil the water.

The story does not end at that. There are other organisms like *algae* and *protozoa* who live on the inorganic minerals. They are like the salt of the earth; they eat up germs and save people from an endless number of water borne diseases. *Algae* and *protozoa* eat up the inorganic wastes; and in the process convert them into organic ones and release a lot of oxygen. So in a river, there are agents who keep the water pure without receiving and remuneration. *This is called the natural purification process.*

The *aerobes* and *protozoa* need oxygen. The natural water usually has the required amount of it in the form of dissolved oxygen. When the amount of waste goes up, the multiplication of these organism also fastens till a point is reached where these is no more oxygen left. The *aerobes* and *protozoa* start dying, their position is taken over by the *anaerobes* who alone survive the holocaust. *The river starts dying, then.*

The scientists use a few technical terms to describe this process of death. The most important among them are Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and pH. The BOD is the amount of oxygen required to sustain the acquatic organism. When the organisms increase in number the BOD goes up. A high BOD is an index of pollution. The BOD of pure water should not be above 3 mg/ltr.

pH is the measure of hydrogen ion concentration in water. In simpler terms, it tells you if the water is *acidic* or *alkaline*. It is measured on a 14 point scale, at 7 water is neutral, below that it is *acidic*, above that *alkaline*. An abnormal pH tells you for certain that the water is impure. A normal pH, in contrast, does not mean that the water is pure. More about it later.

The scientefic Findings

The first scientist to analyse the polluted Chambal water was DK Mitra of the Public Health Engineering Department, Bhopal. The results obtained by him in 1969 were alarming. But no one took it seriously. The water had heavy metals like zinc, dangerous chemicals like sulphide much above the permissible limit; there was a lot of acids, no dissolved oxygen to support fish and other life forms, it had a COD of 142. The government did not move. (See Table VI).

A few sincere engineers and scientists talked about the serious situation posed by the industries in Nagda. Few reports came out in a section of the press, but no one deemed it necessary to carry out a sustained campaign. As far as the government was concerned, Mitra's Report was not even worth the paper on which it was typed.

Four years after Mitra's analysis, a new chemical unit was set up in the GRASIM complex — the *Chlor-Alkali* Unit which produces caustic soda by electrolising common salt. Electrolisys involves use of two metals — one which acts as positive pole and the other as negative pole. The first one is called *cathode* and the second *anode*. In the *chlor-alkali unit*, marcury is used as *cathode* and graphite as *anode*. Mercury is a very expensive metal; as such no businessman in his senses would like to waste even a drop of it. At the same time, there is always a possibility

of a certain amount of mercury going as waste. And filtering this out is a bit expensive.

Since 1972 onwards, the River Chambal's misery added a new dimension. She had, from then onwards, to carry along with her, this heavy metal which would qualify her to be judged as a monster killer. The common man did not know much about the increased pollution load till the year 1978, when a young scientist of Vikram University broke the news. Ramesh Chandra Trivadi collected samples of water from 6 points within a range of 20 Kms., from Nagda for 12 consecutive months.

From each of the sampling station, he collected 5 samples, so at the end of his one year investigation, he had with him 360 samples. This was a step sufficient enough to check any possible sampling or other errors which could creep in an investigation of this sort. Judged in terms of research methodology, this was the first comprehensive study of Chambal water.

In those backward tracts of Malwa, with very little transport facilities, the young scientist had to walk for 15 to 20 Kms., with his sampling kit. He was working against heavy odds; the management was obviously not co-operative. He is on record that they even refused to provide him the correct data on the volume of effluents. To ensure that the young man did his work properly, his guide Dr. P.S. Dubey also had accompanied him at few of his trips.

Two years after Trivadi, another scientist, Narendra Dad of the same university also obtained similar results as far as mercury, zinc, BOD and sulphides were concerned. (see tables VII and VIII.)

The most outstanding among Trivadi's findings from a public Health point of view was the presence of mercury. The content of mercury in water was found to be as high as 0.25 milligram/litre (mg/ltr). This is 250 times higher than the standard laid down by the World Health Organization (0.001 mg/ltr).[21]

What does mercury do to you? It simply makes you dance and die. Its first known victims come from a place called *Minamata* in Japan.

The Dancing Disease

Minamata is a small town in south east Kyushu Island in Japan. Here the Chisso Chemical Company was using *mercury* as one of its raw materials and used to dump its waste in the sea. In 1953, the cats who lived on fish from the bay started behaving strangely. "They walked with a strange, rolling gait, frequently stumbling over their own legs. Many suddenly went mad, running in circles and foaming at the mouth, until they fell — or were thrown — into the sea and drowned. ... Inexorably the dancing disease spread to humans".[22]

People also started dancing and dying. It was only in 1959 that the real agent — the *mercury* — was noticed in the dead bodies. The government failed to act against the company. Mercury from the factory continued to find its way to Minamata bay till 1974. Reports from Japan show that even now people are turning up with symptoms of *mercury* poisoning. Writes Peter B Clark : "While many sufferers have been denied recognition, those exhibiting only one or two of the Minamata symptoms are often diagnosed as suffering from some other disease. The problem is that it is impossible to determine a specific set of symptoms which define Minamata symptoms. The list of symptoms have lengthened over the years and many are still unrecognised and some may remain undiscovered. Medical authorities have estimated that there are, at least, 10,000 victims as yet undiscovered or with latent mercury poisoning".[23]

In Japan thousands of people died a slow and painful death due to mercury. There were many others, more unfortunate, having been forced to vegetate for many more years. Scientists say that many symptoms of mercury poisoning have not been officially recognised. Probably because the industry would have to pay for the damage. An instance of private enterprise trying to stop the onward march of science.

No memorial has been built for the first known martyrs of mercury. Yet they have been honoured. The dancing disease is today known as MINAMATA disease syndrome.

What does mercury and other heavy metals do when they enter into the body ? Along with the food and drink, they move to the intestines. Since the intestines do not know what to do with

it, they simply pass it on to the liver along with digested food. (Probably it is from here that our bureaucrats learned the tactics of passing on the files to some others and say that the ball is in the other court.) The liver has an endless number of recipes for removing the poison which it is likely to receive. But it does not have one for mercury or other heavy metals. So the mercury escapes from the liver as well and reaches the heart and from there to the different parts of the body. Then it simply settles down there. There is nothing in our system which can either destroy or kick this unwelcome guest out. In the tissues, mercury keeps on accumulating and once it gains enough strength, it strikes. That is when you start dancing.

Mercury is a slow and accumulative poison. Its impact would only surface after decades of exposure. Diseases caused by mercury cannot be cured.

If you do not live near or drink water from the polluted river, don't think that you are safe. The mercury can make it to you *via* what is called the natural food chain. The smaller organisms in water accumulate it in their tissues, the larger ones get it when they kill and eat the smaller ones. We usually get it from fish.

There are evidences to prove that fish in the Chambal is playing this carrier role. Dr. K.S. Rao, a zoologist of Vikram University, Ujjain, who has been closely monitoring the pollution of the river says that he has found traces of mercury in the muscles of fish caught from the Gandhi Sagar State Fish Farm. Gandhi Sagar is in Mandsaur district about 150 Kms. downstream of Nagda. According to Dr. P.S. Dubey, a reader in the same University, "*zinc* upto 70 parts per million (ppm) has been found in the liver and muscles of fish from the Chambal river"[24]. From Gandhi Sagar, fish is exported to far off places like Calcutta and Delhi. When the Calcuttans would start dancing, their doctors wouldn't even know which side to look for the cause.

The vegetarians might think that the threat is beyond them. Not necessarily. You can get it from milk too. The grass and plants growing on the banks of river accumulate mercury in their stems and leaves. The milch animals eat them and they finally transfer it to its original source — man. *Kalu* is a river which

flows through North East Bombay, where this chain of mercury has been noticed. "There is 5 ppm of mercury in the milk of milch cattle that graze on *pycreus* plants. A child drinking one litre of milk everyday consumes 35 ppm of mercury which is well above the safe level. Over a period of several months this can lead to accumulation of over 0.3 mg of mercury which is well above the safe level",[25] cautions the Centre for Science and Environment, New Delhi.

At the very outset of this Report we have gone through many of the complaints of the villagers. Such non-specific symptoms are possible even among people free from pollution hazard. But when a group of symptoms predominates in a particular area at a level which is quite higher than the average then a thorough investigation is warranted. Dr. Trivadi who spoke to many villagers suggested that many of them might be possible victims of *Minamata* disease.[26]

With the present level of knowledge, the assessment of mercury level inside the body before the appearance of symptoms is very difficult and involves a complicated process. Investigation of *feces* or *urine* would not yield any thing. The best known indicator is the *hair* from which the level of *mercury* in blood can be assessed. The method of measurement is called *Flameless Atomic Absorption.*

A detailed medical survey is warranted to see if non-specific symptoms of Nagda villagers are mercury related or not.

Some Limitations

The Factory Management has not been very receptive to the idea of independent Scholars doing the water analysis. For obvious reasons. Dr. Trivadi writes in his thesis: "the exact volume of effluents could not be known due to the non-cooperation of the management". Dr. K.S. Rao says that the Management has time and again refused permission to take samples from inside the factory.

One of the serious drawbacks in all the studies is that the samples were collected during the day time. Since the factory has absolute control over the discharge of pollutants, it is possible that they might have been discharging the more toxic effluents

during the night time. The residents of the workers slum on the bank of the *nallah* which carries the effluents say that during midnight, there is a high concentration of gases. That the factories resort to the practice of withholding the discharge of the deadly poison during the sample collection is well known.

It is with the explicit intention of countering such malpractices that the Rajya Sabha Committee which looked into the pollution of River *Mahanadi* (Orissa) pointed out the need for "conducting surprise analysis of the content of water from different sources"[27]

There is yet another limitation to our present level of knowledge of Nagda pollution. All the water samples were collected from the surface. We do not know what is happening at the bottom layer of the river. During the course of its flow, the heavy metals and other chemicals settle down at the bottom sediments, from where the micro-organisms consume them. These micro-organisms can travel down and transfer the pollutants to the aequatic animals downstream.

Almost all the studies point out that the river is totally dead for a stretch of 30 Kms from Nagda. The river gets slowly purified through the process called natural purification. This in anyway does not mean that the river is safe after 30 Kms from Nagda. The Chambal being a non-perennial river, the concentrated effluents keep on accumulating at places, during the summer months, when there is no flow. During the first rains, when the river starts flowing again, there is a heavy concentration of poison, much above the natural purification capacity of the river. This results in human, cattle and fish mortality in places which are otherwise safer. Heavy fish mortality at Gandhi Sagar during the first rain has become a routine, says Tavarchand Gehlot, MLA. Basing on the information he received from the officials of fish farm, when Gehlot raised a question in the Assembly during October 1982, the government said that it had no knowledge about it.

The drinking water problem for people in and around Nagda has reached a new dimension. From the river, the chemicals have seeped into the sub-soil resulting in pollution of well-water as well. This has become very acute in 14 villages like Juna Nagda, Rajpura, Tal, Lodh etc., according to T.C. Gehlot. These villagers

have been forced to abandon their wells and fetch for their drinking water miles away. There are other evidences of seepage also. The effluents of the Chemical Division (at the Southern end of the complex) flow through the road side drainage. The cement plaster of this drainage has been completely destroyed by the powerful chemicals. On the side of the road, few acres of farm land have become a desert with not even grass growing on it.

In the past, when the peasants agitated, the Management had agreed to dig wells in a few villages. Work on one such well in Juna Nagda was abandoned mid-way. This abandoned well has now become a grave health risk for the villagers. During rainy season, it becomes a breeding ground for mosquitos. The Management, before abandoning, even forgot to fence it off, risking the lives of children and cattle. There is a saying in Malwa — "went to seek a son, and came back loosing her husband" (*Mangne gayi thi poot, Kho aayi khasam*). This is where the Nagda villagers are today.

During the year 1977, the Management had agreed to provide water supply facilities to few of the villages where the situation was most acute. The scheme fizzled out when the Management expressed its inability to pay for its maintenance, says Gehlot.

We have heard the peasant's complaint that the water is unsuitable for irrigation too. The Management asserts that even the effluent is fit for irrigation. As evidence, the Manager shows a picture of a bumber crop irrigated entirely by the effluents. In yet another picture, there are a few smiling farmers, who, the manager says are thrilled about the bumper crop.

The scientists measure the suitability or otherwise of water on a scale called Sodium Absorption Rate (SAR) value. Beyond an SAR value of 5, the water is totally unfit for irrigation. Dr. Trivadi found the SAR value of Chambal water during the summer as 9^{28}. Remember, the value of undiluted effluents would be much higher.

Effluent Treatment Plant

The Management and the Pollution Board have been trumpeting a treatment plant built at a cost of Rs. 2 crores. What is the history of this treatment ?

During the early seventies, in response to the peoples agitation, a treatment plant was set up. What is the treatment like ?

"Adding a few bags of lime (Calcium Carbonate) about 80 bags a shift, is all what we do there. And that too not very regularly", says an employee working with the treatment plant. What happens if you put lime in water which is predominantly acidic ? The acids react with lime (which is an alkali) and produce their respective salts. The water is now neither acidic nor alkaline. As far as mercury, zinc, sulphide and BOD are concerned the situation remains totally unchanged. Earlier there was a lot of acid in the water. Now in their place, there are few more salts. We have earlier noted that an abnormal pH is an index of pollution, a normal pH on the contrary is not at all a guarantee of purity.

One basic difference between the results of Trivadi (1979) and Narendra Dad (1981) is the pH. Trivadi's samples showed an abnormally low pH. Dad found it almost normal.

TC Gehlot who was a member of the Legislative Committee which visited the factory during September 1982 says that almost all the days the plant does not work. "In the name of filtering, they remove the solid waste (viscose etc.,) and nothing else. The plant does not work regularly. When we visited, the plant was not functioning. And the Management even refused to give us the log book".

In a criminal petition filed against the company, Mr. Babulal Bharatiya alleges that "the treatment plant is just a show piece. Almost all the time, it remains closed ... On 25 July 1980, when the Executive Engineer of the pollution board (Pradooshan Mandal) came to inspect the plant, he found that it has been closed since many days ago."[29]

Setting up of show piece treatment plants is an old game. "When forced by circumstances to install treatment plant, they found it more convenient to bypass these plants and throw the effluents directly into the rivers, keeping the plants as model to exhibit to VIP and uncomfortable committees and enquiries. The action of Gwalior Rayon in Mavoor is a case in point".[30]

Something in the Air Too

The entire Nagda town and the surrounding villages within a radius of 5 Kms. are a mini gas chamber. The victims are not only humans, but also birds, animals and plants. The human victims number about half a million, forty percent of whom are below the age of 14.

Says Dr. P.S. Dubey of Vikram University : "Its (GRASIM's) chimneys emit carbon-dioxide (CO_2), Carbon-monoxide (CO), Sulphur dioxide, (SO_2) and Hydrogen-sulphide (H_2S). As a result, crops and trees are affected. ... This also has deleterious effects on the health of workers as well as non-workers".[32] (Dr. Dubey is a botanist, hence the primacy to crops and trees). Apart from the gases, the factory produces an estimated 50 tons of fly ash (produced when coal is burnt, which is as fine as talcum powder) which is dumped in an open ground near Nagda Railway Station to be taken care of by winds.

We have seen what the three gases which are present in the shop floor can do. Carbon-di-oxide, carbon-monoxide and fly-ash are also highly toxic. Excessive inhalation of the second one can lead to instant death by choking.

Here again, workers and their families are the worst affected since most of them live in a radius of 1 Km., from the factory. "There are children, born with genetic defects, attributable perhaps to the pollution", says a Junior Doctor of the ESI. Nagda is witnessing the growth of a new generation, a generation which has not even for a day had the fortune of breathing unpolluted air.

The worker's colony is a veritable slum. This slum (with over 500 huts) is situated on the side of that open *nallah* which carries the filth from the factory. (A new river vally civilisation !) The factory has sufficient open land, but the Management refused to allot any site other than this.

Durgapura, a village now turned into an industrial slum also presents the same pathetic picture. Located on the east of the factory, the west wind carries the gases emitted by the chimneys straight into this village.

COMMUNITY HEALTH CELL
47(1, (First Floor) St. Marks Road,
Bangalore - 560 001

Even the school children cannot get a respite from the gases. The GRASIM High School with over two thousand children is located just on the side of the *nallah* and less than a hundred yards from the power house, whose chimney emits CO_2, CO and SO_2. "Instances of a few students fainting during the prayer meetings are very common", says a school teacher.

"The incidence of diseases of the respiratory system and digestive system is on the increase in Nagda", says the Medical Officer of the Government Hospital. Almost everyone in Nagda suffers from indigestion. "Digiene or some other Ayurvedic recipe is part of life in Nagda", says Mrs. Kokila Bharatiya.

For the farmers, the gases mean total destruction. The gases burn the crops mainly during the flowering season. The Management also accepts this. That is why they compensate the farmers, "a compensation which is not at all commensurate with the damage. The rate of compensation is arbitrary. It depends on the sweet will of the Management", says Bhairon Singh Tomar of Padlia. "This payment was earlier known as Crop Compensation. Now they have changed its name to Land Development Fund; may be to escape the charges of pollution", says Tomar.

No independent monitoring of Nagda air has been done so far. The Vikram University is presently engaged in the measurement of sulphur di-oxide. This is being done by *iodin method*, considered to be a very primitive one. The University does not have an air sampler.

When asked about the peasants complaints of crop damage and ill-health caused due to air pollution, Kishorilal, the Manager of GRASIM listed the various measures taken under the Land Development Scheme.

The polluted air does not leave any one. Not even the higher-ups in the Management. Like those generals sitting on the modern war machines, the Manager also knows this : "Air pollution does not discriminate classes. Like a nuclear war, it hits all, the rich as well as the poor" !

PART III

POLITICS OF POLLUTION

Pollution it not free from politics,
Politics is not free from pollution either.
Polluters and Politicians are related.
Symbiotically.
Today at the receiving end are the people !

Politics From Above—The Games the Controllers Play

"The control board constituted for this purpose has been relying more on persuasion, than on prosecution, *a too optimistic approach with the customers it has to deal with*"[35] says the editor of *Indian Express* on pollution control measures in India.

D.V.S. Murthy might disagree with the last part of the above statement because all his customers are nice people. And, Mr. Murthy heads the Pollution Control Board of M.P. Apart from heading it, he also calls press conferences and writes signed articles in local newspapers to apprise their readers of the exact situation on pollution front in his state. We quote him "the group (Birlas) has built temples for spiritual and cultral awakening. Its efforts to protect the environment are equally laudable."[36] Most of you might have ignored it because it was part of an advertisement. As far as the spiritual part is concerned, too many people might not disagree with him. The religious Hindus of Nagda who are fortunate enough to take their worries to the marble idols of *Seshasayi (Vishnu)* in Birla Mandir won't. Even scientific institutes with international recognition have praised this spiritual role. Talking about River *Sone*, which receives "coffee coloured lethal to cattle and people "effluents from the Orient Paper Mills, Amlai in Shahdol district, M.P. (owned by the Birlas), the Centre for Science

and Environment says "a temple was built and *Hanuman** mandals organised to sing bhajans; booklets of bhajans, musical instruments, clothes for children, exercise books and blankets were distributed free." [35] On the pollution front, the same document has three case studies of gross violation of anti-pollution laws-Zauri Agro-Chemical Industries, Goa, Orient Paper Mills, Amlai, M.P. and Gwalior Rayon Mills Mavoor, Kerala. All owned by the same house.

Almost during the same period, as Murthy made the above statement, Jagadamba Prasad Yadav, Minister of State for Industries in Union Ministry had something contrary to say on issues like violation of pollution control acts by this house ; "It was found that contravention of industrial directives and regulations in such a blatant manner had come to the notice of the government as early as 1968/69." [38]

During this period Dr. Narendra Dad of Vikram University was engaged in the analysis of the polluted *Chambal* water. He could not find any great improvement in the water quality. This analysis was done by a premier institution of learning maintained by the state exchequer. If his analysis was biased, there is definitely a way to resolve it. And more important, the scientists using peoples funds cannot be allowed to distort facts to suit their private ends.

The Ostrich

Old habits die hard. There is a bird called ostrich found in the deserts of Africa. When faced with danger, it buries its head in sand. May be to believe that the danger does not exist. In a Seminar on Environmental Pollution held at Bhopal in December 1975, Mr. M.N. Buch, Secretary, Town and Country Planning Department of M.P. talked about the alarming situation posed by the GRASIM. It was he who broke the news of contamination of wells in the area. The ostrich preferred to bury his head in sand. A little while later he spoke of the pollution caused by the agriculturists.[39] No comments.

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* *Hanuman* is the monkey-god, the faithful servant of Lord Rama, one among the nine incarnations of Vishnu. Marx found it very difficult to understand us the Indians who were worshipping monkeys and cows. Many of us still do.

Occasional reports on pollution have been appearing in a section of the local press. The *Hitavada* carried part of a speech delivered by Pushkar Nath Kazi in a meeting of the Institution of Engineers. "Pollution is noticed upto 25 to 30 Kms. downstream of the factory at Nagda. For a length of about 50 miles, the entire acquatic life is lost and water is rendered unfit for drinking purposes not only for human beings, but also for animal life." Thick layers of conscience were left unpierced.

When the presence cf the monster pollutant, mercury, was observed by R.C. Trivadi, a brief report by Anil Korde appeared in *Nai Duniya* on 14 January, 1978. A week later, an article, double the size of the original, appeared in the same paper. We quote from Arun Jain, the author : "Mr. Trivadi alone would be able to tell the source of his thesis. But the premise of the thesis is poles apart from the reality". The newspaper has all the right to question the reliability of a scientific finding. But before throwing one finding into the dust bin, they are expected to have a more reliable data base. We do not know if the author or the newspaper had one. Arun Jain goes on "It is also surprising that apart from writing the thesis, the author is involved in cheap politicking. He met the collector with a deputation over the *so-called pollution.* This shows that the interest of research is something else". A new lesson for the students and scientists: "Sit on the fence and shut your eyes, when someone is taking away the right to life and liberty of an illiterate villager". The press campaign died out for the time being.

During the mid-year, an article by Dr. P.S. Dubey appeared in *Nai Duniya.* That was a comprehensive report of the state of environment in the entire state. It contained only one paragraph about Nagda. Dubey wrote: "Apart from chloride, sulphur and sulphide, there is mercury, zinc and sodium much above the premissible limit." [41] Within a week, in a press conference, D.V.S. Murthy talked about the control measures adopted by the Management at the instance of the Board[42]. A few days later: his assistant, Dr.G.K. Khare, wrote a long article in the same newspaper, wherein he denied the charges of air and water pollution. The entire article is devoted to defend the measures taken by the Management to prevent pollution. "The contents of zinc in water has been reduced. It now corresponds to ISI standards. The last phase of the treatment plant would be ready in a few months. Then the

effluents would strictly correspond to the ISI standards. As far as *mercury* is concerned, the factory never used to flow mercury with the water"[43].

Khare— The Chemist

Being a chemist, Dr. Khare should know better. He would definitely be aware of the production process of caustic soda- the various technologies available and their relative advantages and disadantages. That under the existing level of technology, a certain amount of *mercury* going out as waste is unavoidable. He definitely knows that the technology available at GRASIM, (ORENZEO DENORE, Italian) is not the most modern. Dr Khare might have also read a document prepared by the Central Board for Prevention and Control of Pollution which says: "In practice, however, mercury is lost from chlor-alkali works. The reasons for loss of mercury are many. The main reason is its properties, both physical and chemical. It is the only metal which remains in the metallic state over a wide range of temperature. It is understandable that such a heavy metal with high mobility and vapour pressure will try to escape into the environment despite precuation. A 100 ton caustic soda plant receives replenishment to the tune of 35 kgs of mercury a day. Total handling loss has been estimated to be between 40-50 gms per ton of caustic soda"[44].

The Central Board says that the caustic soda units in the coun try discharge a total of 166 tons of mercury along with its effluents every year. The document includes Nagda unit also. Had the Nagda unit been an exception, the Central Board should have clearly stated that. Hope the mistake would be corrected once Dr Khare is promoted.

These days, even industrial managements have started accepting the mercury pollution caused by them. Listen to RV Ramani, Managing Director, Mettur Chemical and Industrial Corporation: "despite vigorous efforts, it is inevitable that some pollution in the shape of mercury emission occurs."[45]

He Came, He Inquired!

During the early 1978, a Committee headed by Dr Khare had 'investigated' the pollution problem from all angles-health, drinking water, agriculture etc. (Its report was, however, not provided

to the opposition parties) Dr PS Dubey, the scientist who had broken the news of the monster pollutant in Chambal was not included as a member, despite his request. The Committee found that all was fine at Nagda. It rejected the complaints of illhealth of the people on the plea that they did not produce any medical certificate !

But then, Dr Khare had made two statements which might serve as an evidence of pollution related health hazards. One is in 1972, when he co-authored an article on Chambal pollution, using the data obtained by Dr Mitra. He said 'there was alarming level of zinc in Chambal. In June 1978, he made yet another statement : "the factory retrieves 2 tons of sulphur, carbon-di sulphide and sulphuric acid from the gases.... *Earlier this used to be left in the environment*". By his own admission, the Treatment Plant which purified the effluents and controlled the gas comission, was commissioned in 1978.

Are we to believe that the chemicals and gases released into the Chambal and air at Nagda for over 24 years were as idle as the Pollution Control Board ?

Credibility of Academic Research.

The Water Pollution Control Board says that the effluents conform to the ISI standards. Ujjain University scientists say no. These two counter claims have not been resolved, so far. And there seems to be no move towards that end either.

Few questions.

(i) It was the university which initiated the dialogue. The Khare committee went to 'investigate', though reluctantly, after hearing the scholars speak aloud. Why was Dr Dubey not included in the Committee, despite his requesty?

(ii) Dr KS Rao of the Department of Zoology, who guided Dr Narendra Dad says that the Board still shies away from a meaningful dialogue. Why?

(iii) Before a doctorate is awarded, the thesis is evaluated by an external examiner who is competent in the field. There are instances of a thesis being rejected for reasons of low quality or

lack of proper evidence. The Board which claims that the premise of the research is false, could have seen to it that the scholars are not awarded their degrees. Accepted that the universities are autonomous, (like the Pollution Control Board) but this does not give them licence to use the tax-payers resources and twist the facts. If the Board is certain that the university is wrong, it still con get the issue arbitrated by an external agency. Why does not it do that?

In the first place this is not a simple theoretical controversy between two groups of scientists which can be resolved in a leisurley fashion. The issue at stake is the life and liberty of millions. *Secondly*, both the Board as well as the varsity are Institutions maintained by the public exchequer. The tax payer has a legitimate right to demand that these institutions hehave properly. They cannot be allowed to twist scientific evidence to suit their own private ends. *Thirdly*, the controversy is not simply one between Ujjain University and M.P. Board. The former receives its grants from Council of Scientific and Industrial Research, University Grants Commission, Indian Council of Social Science Research etc. In the Nagda controversy, what at stake is the credibility of the academic research in the country as a whole.

The planning Commission has an ambitious project to involve university students in the environmental campign with an allocation of Rs. 14 crores. The scholars at post-graduate levels would undertake pollution studies. At Nagda where the scholars have already done a thankless job is a test case.

What do the people think about governmental mesaures to prevent pollution? That way many committees have come and gone, says at trader. In Nagda, after about three decades of agitations and appeals, there is a streak of pessimism amongst almost all sections of society. "Lakhs of rupees are spent by the Management to suppress the truth. Those who grumble would have to face false litigation and other repressive measures", says a leaflet dated 27-4-1975. "Usually it so happens that the officials deputed to investigate do not like to meet the people. The moment they arrive, they are picked up by the company car and put up at the guest house".[46]

The Kerala Experience

Kerala is perhaps the only state in India where the people came out on the streets on the issue of environmental pollution and forced an importent governmental machinery to act. The anti-pollution struggle there, began in a small industrial town called Mavoor (in Calicut district) where Birla group has its pulp and rayon mills. Its wastes, which are as toxic as those of Nagda were used to be dumped in river Chaliyar. Villagers organised themselves against this pollution. Scientific cover for the battle was given by a voluntary organisation called Kerala Shashtra Sahitya Parishad (KSSP). The scientist of the Parishad examined the polluted water and published its result. As in Madhya Pradesh, the Kerala Water Pollution Control Board came out in defence of the Management. The people did not give up; the press also joined the battle and ultimately the Board was forced to accept the truth.

Today, the Kerala Board does what it is supposed to, though hesitantly. The latest of its prosecution of the factory was done on 31-1-1981, for non-compliance of an earlier agreement by the mills that the effluents would be carried away from the factory through 6 Kms. long pipe line, instead of discharging it just near the factory gate.[47] The pollution hazard of Chaliyar still continues. Reports *Indian Express* : "The threat of pollution of the water sources from the effluents of the Gwalior Rayons still persists. As the water level from the river lowers, effluents are reported to be still discharged clandestinely at the old outlet. Eventually, representatives of Kerala Shasthra Sahitya Parishad, KWPCB and PHED had been entrusted to make a study of the problem and suggest temporary as well as permanent solution to the problem"[48] In M.P., investigation of pollution is a private affair of the Board and the Management. The people have no representation in a committee for enquiry. In Kerala, the Water Pollution Control Board does not hold any monopoly power. In fact, it is the people and their organisations which matter.

We have seen some of the profound statements of the M.P. officials. What do the Kerala Pollution Control Agencies say? "The Chaliyar river, the most polluted river in the state, is receiving 548 lakh liters of waste materials from the pulp and staple fibre factories of Gwalior Rayon at Mavoor. The water in the river

downstream is polluted heavily with BOD as high as 2500 ppm and disolved oxygen as almost zero."[49]

The Chalyar struggle has now reached its new heights. The people are now demanding that government take over of the mill.[50]

In Kerala, the battle against pollution has not been won. It has not been lost either. It would not be, so long as the people keep up the pressure, the scientists and the intelligentsia share their knowledge and try to help the villagers, the chief editor of a prominent local daily cannot be cowed down by the threat of withdrawal of advertisements; and the advertisement manager of the newspaper does not bother if his wife loses her job in the factory school.

The Spineless Machinery and A Toothless Act

The Water Pollution Control Act was enacted in 1974. It vests the state Water Pollution Control Boards with monopoly right to deal with the erring units.

After eight years of its enactment, what is the balance sheet of pollution control measures in India? "The lesson of ecology is being learned the hard way in India and the process of enlightenment is slow.....The debilitating effect of polluted water and air in our crowded cities and even in villages has become too apparent to ignore,"[51] says B.B. Vohra, Head of the National Committee on Environmental Planning. (Process of enlightenment is definitely slow, not among the victims, but at the level of those who 'monitor' and 'control'). It is evident from his statement that neither the Act nor the machineries set up to implement them has lived upto their expectations. What went wrong?

"Water Pollution Control Boards are not effective, because the pollution control acts are neither comprehensive nor severe enough", says GH Lalwani, Former Chairman of Maharashtra WPCB, "WPCB can not shut down a factory for persistently disregarding pollution levels, but can only prosecute the offender in civil courts where cases drag for a long time".[52]

Lalwani is only partially correct. The Act is weak, agreed, but the actors are weaker. The case of Madhya Pradesh, where the Chairman of the Board would not prefer to prosecute an erring

firm because "he does not want to scare away industries from this backward state" is only one example. (This Chairman would have us believe that the pollution control acts are operative in his state alone).

The water Act 1974 is not all that weak, though of course it has its loopholes, like many other Acts. Under Section 30 of the Act, the Board can serve a notice to the industry to execute any work related to pollution control. In case the industry refuses the Board can undertake the construction and charge all the expenses on the industry. Again under Section 32, "if the Board is of the opinion that it is necessary or expedient to take immediate action", it can prohibit the company "from discharging any poisonous, noxious or polluting matter".[54]

One serious weakness of the Act from the people's point of view is the monopoly right it confers on the Board. Under Section 49, "no court shall take cognizance of any offence under this Act except on a complaint made by or the previous sanction in writing of the state Board".[55] Power corrupts and absolute power corrupts absolutely.

At a Seminar organised by the National Committee on Environmental Planning, Central WPCB, Kerala WPCB and Cochin University, during October 1981, the following recommendations have been made :—

(a) Separate court be established to deal with pollution cases.

(b) The WPCB be stripped off its monopoly right and any citizen be empowered to approach the court.

(c) The polluting industries should get No Objection Certificate (NOC) from the board.

(d) The Board should be independent of the government.[56] Among the participants was Justice CS Potti, the then Acting Chief Justice of Kerala High Court. The central WPCB is not known to have initiated any amendment to the Act of 1974 on the above lines.

The Air (Prevention and Control of Pollution) Act, 1981 which came into force on 16 May, 1981 more or less dittos the

Water Act. The air maintenance is now the responsibility of water boards, which means that the water *zamindars* have become a bit more powerful. Under the Act, the state government can declare any area as air pollution control area. The Air Act is as strong or as weak as the Water Act.

Prof. Dave, an environmentalist from Jawaharlal Nehru University, New Delhi criticises the Air Act on the ground that it does not confer any power on the Board on the question of land use. "To be effective", he says, "the industries would have to be bound to take the prior permission of the control boards before setting up a unit".

Today in India we have a spineless machinery to prevent pollution. Most of those spineless men say that the Act is toothless. *The experiences elsewhere, be it in Japan, the US or in Kerala, all lead us to one conclusion : Act or No Act, pollution can only be controlled when the people organise to resist it.*

In its onward march, the machines have maimed and murdered many. Any medical man would tell you that the occupational diseases and pollution hazards cannot be cured; they can, at best, be prevented if you clean up the environment. And any environmentalist would tell you that control of pollution is also possible, without affecting production and profit. Today, we know many things about pollution, their possible hazards as well as the ways and means to prevent it.

Anti-Pollution Movement : The Balance Sheet

The struggle against pollution in India is in its infancy. This is so, even in the case of our major cities which compare well with the most pollutted cities of the West. Bombay has a core of activists, (drawn mainly from the science intelligentsia) who take up pollution related issues time and again. In Calcutta, a small group of science workers are struggling to give form to a viable organisation. The Delhi Science Forum, formed in 1980, is yet to chalk out its environmental strategy; the sustained campaign it led in the anti-Silent Valley movement being the only exception. In the nation's capital, the kids are on the forefront. *Kalpvriksh*, an organisation of the undergraduate students which publishes a journal (*Nature*), tries to mobilise public opinion and often takes

the issues to the streets. What is missing in all these places is the involvement of the common man—that illiterate villager or the slum dweller who is the worst affected.

The Kerala Shashtra Sahitya Parishad (KSSP), an organisation of scientists and literary workers, is the only silver lining. To a certain extent, they succeeded to learn with the people and fight against the enemies of environment. The back bone of the movement are the village school teachers and graduate students, who are in constant interaction with the villagers. In the recent past, the top leadership of the KSSP which incidentally knew more about the environment than about the people committed a small strategic error. Their campaign against the Silent Valley (which locked them up in a battle against all political parties from the extreme right to the extreme left) was not well received by the poor in Kerala. If the KSSP won in Silent Valley, it was not because of the pressure from below. That is a different story.

There have been sporadic struggles against pollution in various centres. Many of them have not been able to strike a decisive blow against the enemeis of the people. One of the major weakness of the movements is the contradicting interests of various sections of the society. While a polluting industry means death and destruction to a villager, it is the main source of income for the workers on direct and indirect employment. This in itself does not lead to a contradictory relationship, but in certain cases it does. In the case of Mavoor, Kerala "when the workers started an agitation for monetary benefits, the factory remained under lock-out for 144 days. During the first month of the lock-out, fishes appeared in the river and trees and plants shooted leaves. Though the lock out was a misery for the workers, the surrounding people had a relief in breathing fresh air and drinking fresh water".[34] Peasants were happy. When the non-workers wage their battles against pollution, the workers are being forced to join hands with the management. They are threatened with a possible closure.

Consciously or otherwise, a large section of the people are forced to believe that pollution is inevitable and unavoidable. In Nagda, for instance, a powerful section representing the interests of the peasantry had as early as 1955 demanded that "the factory be shifted to an uninhabited area or to a sea shore".[57] Not a

very attractive proposition for the workers and traders. Even the trade unions seem to have accepted the work place pollution as inevitable. Says Kallat Krishnan of Mavoor : "Unions started agitation for better facilities as more milk and vitamin pills supply inside the factories, and better water supply, garden and play-ground in the workers' colonies".[34] In Nagda, workers have time and again struggled for a few more crumbs. And got them too. The demand to remove the filth from the environment is yet to be raised.

The attitude of the inevitability of pollution is shared by the intelligentsia too. Says Dr Chawla, CMO of Government Hospital, Nagda, "the people of Nagda derive certain benefits from the factory. In return, they have to lose something".

The people have to be told that pollution can be prevented without affecting production at all. This is where the intelligentsia (especially the scientists) can intervene. This has been attempted by a small group of scientists at *Shahdol*. Apart from studying the pollution caused by the Orient Paper Mills from all angles, the *Vidooshak Karkhana* also made suggestions for removing the filth. Unfortunately *Shahdol* does not have any peoples organisation, except of course the '*Hanuman mandalies*'. Not a viable alternative for an anti-pollution organization.

PART IV

THE SEEDLINGS

Despair does not move the wheels of history
It only attempts at halting it
Unsuccessfully, though.
Resignation and retreat is the dominant mood at Nagda today.
This is not the end of the story.
A Retreating society carries in its womb
Seedlings of a new life.
Like the foetus
Living off its mother's blood
Closely guarded from the enemies of life,
Weak and invisible,
Yet strong and visible too. ...

PEOPLE, POLLUTION AND POLITICS

The Story of Rami Bai

Ever since the second General Elections, pollution has always been central to Ujjain politics. All the contesting parties have always promised immediate solution to the problem on their election to power. The two major political groups—the Congress and the Jan-Sangh/Janata have been in power in the state. The MLAs have raised questions, the Ministers have replied them. Yet the problem remains.

An old *Dalit* in *Juna Nagda* village vividly remembers the lone MLA, who had not only raised questions in the Assembly, but

also organised the villagers to fight against pollution. Bhairon Bharatiya, MLA, Khachrod, (1962-67) died during his detention under MISA during Emergency in Bairugarh Jail. According to his sons and followers, the jail authorities, who had conspired with the Birla Management were responsible for this. Despite repeated requests, the Janata Government refused to hold an inquiry into the circumstances of his death.

A veteran freedom fighter and an Ex-communist, Bharatiya was picked up alongwith his friends who were protesting against the alleged murder of a 60 year old Dalit woman and a 13 year old boy of *Mehatwas* village by the security guards of the factory. S.N. Purohit, a prominent trade unionist narrates the incident thus:

"There is a road which links *Mehatwas* village with Nagda town. This is their only link with the outside world. The Management with the help of local Revenue officials occupied the road. In 1975, they decided to block the entry by putting a gate. The villagers protested against this. The Security Guards of the factory fired on the protesting villagers, Rami Bai (60) was killed instantly, Shivlal (13) died at Indore Hospital. The local Police Officer and Mr. Dhariwal, the Manager of the Firm were also present at the time of firing. After two hours, P.D. Malaviya, S.P. Ujjain came to the site, ordered the arrest of the Manager, Security Officer Karan Singh and two Security Guards, seized the arms and cartridges. The S.P. received his Marching orders over telephone.

The S.P. stood helpless before the terrorised villagers. Tears rolling down his eyes, the grandson great of the nationalist faced the veteran fighter—who had all through his life been struggling first against the British and then against the Birlas. Bharatiya did not weep. Fighters dont."

On the murder of Rami Bai, the District Congress Committee demanded that the two criminals Dhariwal (Manager) and Karan-Singh (Security Officer) be arrested immediately so as to restore confidence of the people. 'Else the opposition might use this instance as a weapon to criticise the Government'.[17] That was on 27 April' 75. The opposition did get a few more weeks to talk about it. After that the nation plunged into the *Anusasan Parva* with its new slogan, 'Talk less, work more'.

The Indian National Congress also tried to solve the problems, through memoranda and petitions. The oldest document we could unearth was a leaflet of October 1962 issued by Vaid Kaluram Mawar, a freedom fighter and Congress leader. In the leaflet, he claims that the first memorandum was submitted to the Government in his capacity as Block Congress Secretary on 23rd March, '54. Since then, he has been writing to the Prime Minister, President, Chief Ministers, Ministers, Officials etc. Eight years of letter writing seems to have taught Mr. Mawar a few political lessons, which he could not learn during his freedom fighting days. We quote a statement (originally in Marwari) which Mawar attributes to the Birla family: "What can the Minister do, he eats my bread, moves in my car and lives in my bangalow"?.[57]

Trade Union Movement and State Repression

In 1977, Nagda witnessed a tremendous upsurge in working class politics. Many of the entitlements withdrawn during emergency were fought and won, more and more sections of the workers were getting politicised. Contract workers numbering over 4000 struck work for over 2 months. There was a qualitative improvement in the movement also. That was the mass participation of workers in decision making—whether on launching or changing the tactics or withdrawing an agitation. Secret ballot was introduced to decide major issues. Workers sat opposite the Management on the bargaining tables.

The post 1977 politics in Nagda has yet another significance. For the first time in the history of Nagda, the town and country side witnessed the meteoric rise of a leader, militant, and uncompromising'. S.N. Purohit could successfully turn the contract workers agitation into a people's agitation by enlisting active cooperation of the non-workers too.

It is against this background that the *Democratic Front* with bow and arrow as its symbol won the first ever Municipal election with a clear mandate to rule. The town people thought that the decade old oppression and neglect had come to an end.

The Statesman reported about the umbilical cord which the young workers had established with the town-people. There was militancy everywhere. Expressing the fear across the fence, the paper also cautioned that the new militancy might disturb the

industrial peace in Nagda. The Indian Express and *Ravivar* head lined: *Red Star over Nagda.*'

Those Blood Stained hands

Exactly 25 weeks after the historic victory of the Democratic Front, the *Hitwada*, a local English daily lamented:—"The M.P. Government seems to have thrown all norms of democratic behaviour to winds. . . .Surely TU leaders are not anti-social elements and our constitution provides certain basic rights for the workers. It is possible that Mr. Purohit who is a militant CITU leader regards trade union movement as an instrument of struggle against capitalism. One may or may not agree with his philosophy. But he is fully entitled to conduct the workers struggle provided it does not transgress the laws of the land."[58]

Purohit, the President-elect of Nagda municipality was exiled from the Ujjain commission on 2 April '79. According to Purohit, a few weeks before the order was served on him, the then Chief Minister had a closed door meeting with a senior Management Official at Ujjain. He alleged in his Press Release: "delegates who met the C.M. were told that I would be exiled. The District Administrative Officials also say that they are acting as per the orders of the Chief Minister".[59]

In an Appeal entitled "*Save Democracy*", the Committee for Protection of Democratic Rights, Ujjain said: "to declare the elected representative of people as *goondas* is nothing but humiliating the voters. The workers of Nagda are struggling for their existence and their legitimate rights.....Launching false cases against TU leaders is an attempt at suppressing the democratic rights of the workers.....That whose blood-stained hands are behind all those is now an open secret".[60]

Criminal cases against the Trade Union activists is one of the weapons frequently used by the Management. The Textile Mazdoor Union alleges: "there are 60 false cases against 100 activists. The charges range from dacoity to attempt to murder".[61] In yet another letter "4000 contract labourers working regularly for periods ranging from 20–25 years have been on strike since 7th September '78. Even today, they are being paid Rs. 3–4 per day. 300 worker activists have been arrested. Their total bail

amounts to Rs. 22 lakhs".[62] Says SN Purohit; "even getting advocates to argue our cases is dead difficult. Often, our advocates have been bribed by the Management".

The Movement, in and out of the Mills, was, at a very low ebb during the investigation. But then, we also saw a young woman contract worker in advanced stage of pregnancy stopping Purohit in the middle of the road and asking; '*Comrade, we are ready. When do we start?*'

There was something quite unusual in her eyes. Something as beautiful as the new life she was carrying in her womb...

And the Angry Kids

At Nagda, the kids are angry. Reasonably so. A town with a population of more than 60,000, Nagda does not have a Degree College, while in its neighborhood, even smaller towns with less than 10,000 people have one. While majority of the students have to discontinue their studies because of the exhorbitant travel expenses, a few relatively well-off students have to trek 40 miles and upwards everyday. Girls are the worst-affected, even the well-off families are not ready to send them to distant colleges.

Why does'nt Nagda have a Degree College ? Because the Management does not want one", says Pankaj Jain, the angry young man, doing his M. Com. at the Government College, *Kachrod*. Jain, who is also the General Secretary of the Students' Union goes on" a college means a lot of youngsters assembled in one place. They could mean trouble to the Management which has been raping and pillaging the countryside all these years".

A college opened purely out of the collective efforts of the people had to be shut down a year ago, because the State Government refused to recognise it. "Now we would force the Government itself to set up a college", says Rajen Malpani, another militant student.

The angry kids sent shivers up the spine of the Management on 7th February '83 when they led a successful Nagda *Bandh*. Though directed against the Electricity Department, which was playing games with the Switch Board and also with the student's future, the Management had adequate reasons to be afraid. False

cases, warning to the parents etc., followed. Kids were not impressed.

Of late, the Planning Commission has been toying with the idea of enlisting the co-operation of undergraduate students in environmental education of the villagers. By now, we hope that our planners might have realised that they are a few steps behind the private sector brains. Nagda Management had, three decades ago, foreseen this possibility, and till now succeeded in averting that. Has Planning Commission anything to offer?

"We are planning to launch a sustained movement for the college. This time, it would be do or die", says Arvind Raghuvanshi.

Kids are angry and young! Dangerously so...!

IN LIEU OF A CONCLUSION

Nagda derives its name from the mythical '*Nag Dahan*' (snake sacrifice) conducted by *Janmajeya* of *Mahabharat* fame. The legend has it that *Parikshit*, *Janmajeya's* father (and *Arjun's* son) died of snake bite. The Angry Ruler avenged his father's death by burning alive all the snakes he could lay his hands on. The sacrifice symbolises one of the few battles between man and gods in which man turned out to be victorious.

Today at Nagda, both men and gods have lost. The marble idol of *Vishnu*, reclining under the hood of *Sesh Nag* (a sanke god) in *Seshasayee Mandir* (popularly known as *Birla Mandir*) is also not free from pollution. *Sulphur-dioxide* and *fly-ash* do not choke the idol, but they definitely blacken it. Marble idol can be washed, with a negligible investment. And this is being done too. Peoples' lungs darkened by *carbon-monoxied* and *sulphur-dioxide* cannot be washed; lung and heart diseases can not be cured; paralytic victims of carbon-disulphide and hydrogen-sulphide cannot be saved (except, of course, by mercy killing); and victims of mercury cannot be prevented from dancing and dying. Till the controllers are woken up from their deep slumber and forced to act.

Table I

List of workers died of work-related diseases

S. No	*Name*	*Department*	*Cause of Death*	*Year*
1.	Kannan	CS2 Mfg Unit	Heart Disease	1982
2.	Balakrishnan	Caustic Soda/Transport	-do-	1982
3.	Mandho Singh	Security	-do-	1982
4.	Umashankar Srivastava	Spinning Sec.	-do-	1977
5.	Yanathan	Power House	-do-	1982
6.	Babulal	Power House	-do-	1982
7.	Premchand Sharma	Viscose	-do-	1982
8.	Sri Dubey	Canteen	-do-	1982
9.	Madanlal Mawar	Maintenance	-do-	1981
10.	Mansukh	Workshop	Tuberculosis	1982
11.	Dhurai Sadhu	Viscose	Paralysis	1982
12.	Aziz Khan	Central Maintenance	-do-	1982
13.	Noor Mohammed	Painting	Heart disease	1982
14.	Shahbuddin	Spinning	-do-	1982
15.	Avantilal	Workshop	-do-	1982
16.	C.V. Gopalan	Spinning	-do-	1979
17.	Aravindan Nair	Spinning	-do-	1982
18.	Madan Siddnath	Spinning	-do-	1979
19.	Dhaniram	Spinning	-do-	1982

Source : Krishnaswamy, Member, National Council of AITUC and a worker in GRASIM.

Note : Ours was a quick survey. Hence, this list is incomplete.

Table II

List of workers now suffering from work related diseases

S. No.	*Name*	*Section/Deptt.*	*Disease*
1.	Beniprasad Dubey	Viscose	Paralysis
2.	Aziz Bhai	Refrigeration	-do-
3.	Raghunath	Viscose	-do-
4.	Gyansingh	Simplex/Steeping Press	-do-
5.	Donger Singh	Spinning	-do-
6.	Ram Kumar	Spinning	-do-
7.	Misrilal	Auxiliary	-do-
8.	Mangelal	Auxiliary	-do-
9.	Prabulal	Auxiliary	Sciatica
10.	Sadasiv Rao	Laboratory	Rheumatism
11.	Kanaihya Das Bairagi	Maintenance	Paralysis
12.	Bhairolal Punna	CS2 Mfg. Unit	Paralysis
13.	Mohar Singh	Viscose	-do-
14.	Mahadeo Singh	Not known	-do-
15.	Shyam Singh	-do-	-do-
16.	Dhannalal	-do-	-do-
17.	Mohanlal Soni	Auxiliary	Heart Disease
18.	S.M. Porwal	Not known	-do-
19.	Bhagwati Prasad	-do-	-do-
20.	Madan Mohan Srivastava	-do-	-do-
21.	Pooralal	Auxiliary	-do-
22.	Harilal	-do-	-do-
23.	K.K. Srivastava	Viscose	-do-
24.	Hariram Maru	-do-	-do-
25.	Kaluram Jain	Laboratory	-do-
26.	Kamalchand Jain	-do-	-do-
27.	Ramesh Chand Sharma	Workshop	-do-

Source : (1) ESI Hospital
(2) Trade Union Activists
(3) Personal interviews
Note : This list, is also incomplete

Table III

Concentrations of the toxic gases in the Spinning Sections (Results in Parts Per Million)

	Location or operation	*Factory A*			*Factory B*			*Factory C*		
		H2S	*CS2*	*H2S+ CS2*	*H2S*	*CS2*	*H2S+ CS2*	*H2S*	*CS_2*	*H2S+ CS2*
1.	General atmosphere in Spinning room (near old Unit)	4.3	15.1	19.4	9.3	24.1	38.4	6.7	8.1	14.8
2.	General atmosphere in Spinning room (near new Unit)	2.0	2.2	4.2	9.1	8.5	17.6	—	—	—
3.	Spinning operation (Old Unit)	7.4	15.3	22.7	11.3	31.5	42.8	16.3	20.2	36.5
4.	Spinning operation (New Unit)	7.5	18.9	26.4	—	—	—	—	—	—
5.	Cutter (Old Unit)	—	—	—	11.5	50.4	61.9	—	—	—
6.	Cutter (New Unit)	—	—	—	17.8	44.5	62.3	—	—	—
7.	Roller attendant (Old Unit)	—	—	—	18.6	58.1	76.1	—	—	—
8.	After treatment (Old Unit)	4.5	5.8	10.3	6.5	39.9	46.4	2.2	4.0	6.2

9.	After treatment (New Unit)	2.7	4 3	7.0	12.9	39.0	51.9	—	—	—
10.	Cake ageing room	—	—	—	—	—	—	7.7	21.0	28.7
11.	Hydroextraction	5.9	5.0	10.9	—	—	—	2.4	3.1	5.5
12.	Cellophane Unit near coagulation tank	10.9	20.2	31.1	—	—	—	—	—	—
13.	Cellophane unit near coagulation tank after treatment	5.2	14.4	19.6	—	—	—	—	—	—
14.	Cellophane unit near coagulation tank Driors	5.0	9.2	14.2	—	—	—	—	—	—

Table IV

Concentration of toxic gases in the Spinning Acid Bath Section (Results in Parts Per Million)

Location of operation	*Factory A*			*Factory B*		
	H2S+	*CS2*	*Total H2S+ CS2*	*H2S*	*CS2*	*Total H2S+ CS2*
Spinning acid bath house near zinc pot.	—	—	—	81.4	1.7	83.1
Spinning acid bath house near zinc pot mixing tank.	6.4	8.6	15.0	72.1	1.5	73.6
Spinning acid bath house near Zinc pot near filters	3.0	12.2	15.2	14.6	4.0	18.6

Table V

Average daily exposure of workers to the different toxic gases

Operation	*Factory–A*			*Factory–B*			*Factory-C*		
	CS2	*H2S*	*SO2*	*CS2*	*H2S*	*SO2*	*CS2*	*H2S*	*SO2*
CS2 retort attendant	—	—	29.0	—	—	17.8	—	—	17.1
CS2 distillation plant attendant	15.5	0.5	—	5.0	2.2	—	4.0	3.0	—
H2S04 Plant attendant	—	—	—	—	—	4.6	—	—	8.5
Churn room operator	4.2	—	—	11.3	—	—	17.5	0.8	—
Churn room helper	9.7	—	—	41.6	—	—	42.0	0.8	—
Churn room fitter	0.7	—	—	10.1	—	—	—	—	—
Viscose ripening room attendant	2.5	—	—	4.5	—	—	5.0	0.7	—
Spinner (D.B. Old)	15.5	5.0	—	30.3	10.3	—	11.1	10.3	—
Spinner (B. New)	2.2	2.0	—	26.5	13.5	—	—	—	—
Spinning after treatment tank attendant	5.8	4.5	—	39.0 (Old) 39.9 (New)	6.5 (Old) 12.5 (New)	—	6.3	5.4	—
Cellophane section operator	14.6	7.0	—	—	—	—	—	—	—
Spinning section Maintenance staff	5.1	4.3	—	29.1	9.3	—	—	—	—
Spinning acid bath attendant	9.6	2.0	—	2.7	43.4	—	—	—	—
Laboratory staff	4.4	—	—	7.7	5.5	—	—	—	—

Source : Viscose Rayon Report.

Table VI

Pollution level in the Chambal 1968

Parameters	*Distance from Nagda*					
	Upstream (Kms)			*Downstream (kms)*		
	*2 kms**	*0.2*	*2.0*	*5*	*16*	*20*
pH	7.6	3.5	4.0	5.0	5.8	6.6
Acidity	Nil	315	370	360	285	215
Zinc	Nil	9.4	8.9	8.2	3.2	3.0
Sulphate	24	1537	1444	1420	1210	1010
Total Solids	386	4264	2676	2460	1980	1662
Suspended solids	7.6	236	220	200	132	112
Chemical Oxygen Demand (COD)	Nil	142	131	126	68	50
Chlorides	64	253	235	231	166	140

Source : Analysis conducted by DK Mitra, Suptd. Engineer, PHED, Bhopal. Quoted from papers submitted alongwith criminal petitions No. 52/74 and 3187/80 between Babulal Bharatiya, *vs* Management GRASIM in the courts of Judicial Magistrate (First Class), Khachrod and Chief Judicial Magistrate, Ujjain.

* Refers to the unpolluted Chambal.

Table VII

Average pollution load on Chambal river by GRASIM Complex

Ser	*Parameters*	*Concentration mg/Ltr*	*Total Quantity Tons/day*
1.	Total dissolved solids	3250	260.04
2.	Total suspended solids	330	26.40
3.	Acidity (as $CaCO_3$)	530	50.40
4.	Biological Oxygen Demand (BOD) 3 days/37°C)	254	20.46
5.	Chemical Oxygen Demand (COD)	622	49.76
6.	Chlorides	410	32.80
7.	Sulphates	1021	81.66
8.	Sulphides	49	3.88
9.	Sodium	660	52.82
10.	Calcium	221	17.71
11.	Magnesium	63	5.00
12.	Zinc	12.3	0.984
13.	Mercury	0.253	0.020

Note : Average volume of effluents 80,000 cube meters a day.
Year of Sampling 1977

Source : Trivadi, Ramesh Chandra, "Pollution Studies in River Chambal with special reference to GRASIM, Nagda" (Unpublished) Dissertation submitted to Vikram University, Ujjain, 1979. Table No 2.1 p 26

Table VIII

Physico-Chemical Parameters of River Chambal June 1979

Parameters	*Concentration (Mg/Ltr)*
pH	6.5
Total dissolved solids	3435
Total suspended solids	368
Free Carbon Dioxide	34.5
Dissolved oxygen	Nil
Biological Oxygen Demand (5 days 20° C)	272
Chemical Oxygen Demand (COD)	569
Chloride	442
Sulphate	900
Sulphide	9
Magnesium	50
Sodium	753
Zinc	9.66
Mercury	0.15

Source : Narendra Dad, "Liminological Studies on River Chambal with Special Reference to Pollution," Dissertation submitted to School of Studies in Zoology, Vikram University, Ujjain, 1981. Table 4, p.45

Recommendations of the Government of India Committee on Viscose Rayon Health Hazards

1. It should be ensured that after the xanthation process is completed in the churn any excess CS_2 in it is exhausted before the churn door is opened for removal of the orange crumbs. (See table IV in this connection).

2. The contents of the churn should be emptied directly into hoppers (mixers) and any manual handling on the floors avoided as far as possible.

3. The cleaning of the churn chould be done in the shortest possible time.

4. Complete enclosure of all spinning machines by means of sliding glass windows should be carried out.

5. Each spinning machine should be equipped with exhaust arrangement to take away the sulphur gases.

6. Local cooling methods should be adopted to offset mechanical heat and the heat of reaction of chemicals at various stages in the process especially on the spinning machines and in churn rooms to keep down the atmospheric concentration of chemicals.

7. In the nature of the process carried out in this industry a well designed and well maintained ventilation and exhaust system is a great asset.

8. Efficient exhaust ventilation should be provided in:—
   Churn room
   After-treatment room
   Spinning bath room
   Spinning machine bays

9. Air conditioning with refregerative cooling is recommended for the spinning section.

10. Expert control must be maintained in the maintenance and correct functioning of the plant and machinery and

processes to avoid any leakages and heavy concentration of any toxic gases in the breathing zone of the workers above the allowable concentrations.

11. Ventilation of churn room should be carried out by exhaust fans at floor level on one side of the room with inlet openings at a higher level on the opposite side to maintain a cross current of air.

12. Routine estimations of CS_2 and H_2S concentrations in the breathing zone of the workers should be carried out to detect any faults in the system and attempts made to keep the concentration of each below 20 ppm.

13. Routine medical examination of all workers exposed to these chemicals should be carried out and results recorded on properly designed forms, atleast once in every 6 months.

14. Restricted hours of work are recommended to shorten the length of exposure. An ideal to achieve should be 5 hours in a day and not more than $2\frac{1}{2}$ hours at a time. (Based on the British Standards—Factory Department Memorandum 1943).

15. The workers in the churn room should use respirators while the churn are being emptied and cleaned.

16. To lessen risk of explosion CS_2 vapour and air mixture should be exhausted in contact with water.

17. The workers must be told of the dangers of the substance and the method of safeguarding their health.

18. The zinc pot for prepartion of zinc sulphate for addition to the spin bath requires to be completely enclosed to prevent heavier concentrations of H_2S gas.

19. The methods of charging of retorts requires adoption of suitable engineering methods to prevent escape of sulphur dioxide fumes in the work room atmosphere of higher concentrations than permissible.

20. The workers in the retort rooms must be provided with suitable respirators and goggles for the protection of

their lungs and eyes from the highlirritant fumes of sulphur dioxide.

(Reproduced from "Carbon Disulphide, Hydrogen Sulphide and Sulphur Dioxide Hazards in Vicose Rayon Industry in India", Chief Advisor of Factories, Government of India, Ministry of Labour, New Delhi, 1959. pp 54-5.

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POST SCRIPT

How the Other Half Lives ?

There is no woman on the shop floor employment. Which means women are free from hazards of the gas. Is this a blessing in an otherwise totally oppressive feudal milieu?

Almost all the men workers exposed to the gases become impotent within the first few years of their service. The damage caused to the reproductive system does not, however, kill the desire. It has its roots in the mind, which is much more than the brain. The frustrated men have a few escape valves—liquor, drugs etc.

What does a husband's impotency mean to a wife who, at a very young age say at twenty five, is forced to adopt celebacy.

Before answering this question, one has also to consider a woman's total dependency on her husband, her feudal upbringing and control mechanisms which impose strict monogamy (for women alone).

Nagda has thousands of such women. The depth of their pain and agony, deprivation and frustration could not be fathomed.....

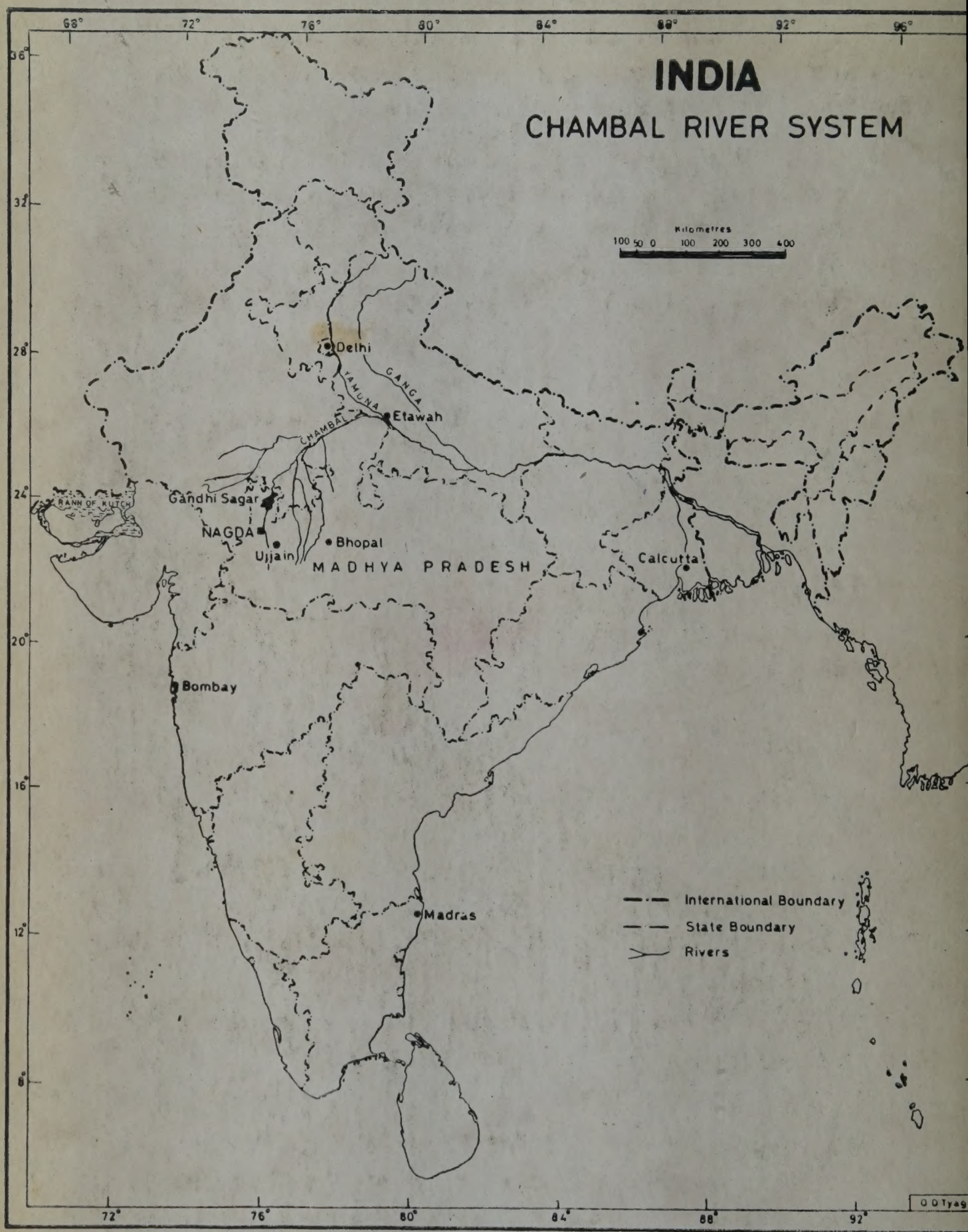
xx xx xx

"All this talk about impotence... I too live in the same atmosphere. Look at my age. I'm suffering from high blood pressure. *But give me two women at night and I'll put all those men to shame*". This is Dr DR Sonar, MBBS, FRCS, Director of the Janaseva Trust Hospital, Nagda. (Sunday, 19-25 June 1983).

We quote this profound statement not to show the contrast between classes at Nagda. There are other, much more powerful indices.

We dont want to label Dr Sonar either. We would put it in the mildest possible manner—Dr Sonar is a Male Chauvinist Physician. Like many other managers, he also believes that a woman is a commodity, which can be *given* and *taken*.

Dr Sonar's existential milteu consists of those who trade in human lives—for a profit. If he expected the journalists, who usually trade in information and ideas to trade in flesh, that is not his fault either.


INDIA
CHAMBAL RIVER SYSTEM
Kilometres
100 50 0 100 200 300 400
Delhi
YAMUNA
GANGA
Etawah
CHAMBAL
Gandhi Sagar
RANN OF KUTCH
NAGDA
Ujjain
Bhopal
MADHYA PRADESH
Calcutta
Bombay
Madras
International Boundary
State Boundary
Rivers
68°
72°
76°
80°
84°
88°
92°
96°
36°
32°
28°
24°
20°
16°
12°
8°